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ANNUAL REPORT

JORNADA RANGE RESERVE

CALENDAR YEAR 1924

By J. D. Schoeller.

FOREST SERVICE

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GS
Investigative Program
Jornada Range Reserve 1925

Progress Report 1924.

Introduction:

The several project reports included within the following pages give the results which have been obtained from a portion of the active projects on the Jornada during the past year.

Owing to the fact that it has been decided to recompile a large portion of the data collected during the past ten years, in order to make it better available for analysis in a more fundamental manner, the natural Revegetation and carrying capacity, projects are omitted from this report.

The carrying capacity for the fiscal year 1924 is, however, included, having been worked up in new form, in connection with the utilization for that year.

The seed germination, results of which there are a considerable number, have also been omitted because of the inability of the New Mexico State College's Seed Testing Laboratory to complete the tests, as yet.

1925 Objectives.

During the ensuing year it is planned to accomplish in addition to the active projects, the following four pieces of work, all of which are of material importance:

The first of the projects in this connection is the recompilation and analysis of the vegetative data in order to arrive at a better understanding of the Natural Revegetation Project which deals with the type of Range common to the Jornada.

The second is the recompilation and analy-

sis of the carrying capacity data on a basis of utilization in order to determine, if possible, the true carrying capacity of this type of range under varied seasonal condition. It is hoped that the reorganization of both of these projects will be well under way by the coming summer.

It is also planned to complete in rather definite form before the coming fall, a new co-operative contract in order that it may be available for use in conference with prospective co-operators. This has already been taken up in a tentative way in correspondence with The Forester under date of March 18.

A new management plan for the Jornada will also be worked up using the former plan as a basis, but simplifying it into a more concise and practical form so that it will be readily applicable and can be more easily understood by and discussed with a future cooperator.

Another project which it is desirable to complete is a new Reconnaissance of the entire Reserve along semi-intensive lines. Two attempts have been made at this the past two years using very extensive methods, but the results have not been satisfactory due to the drouth-stricken condition of the vegetation and because of a decided lack of accurate information on palatabilities. Another difficulty which has been encountered in this work is the spotted character of the growth over the entire Reservation which has made it very difficult to estimate densities and volume. Under the circumstances, it was in a great many cases impossible to differentiate between living and dead vegetation, which caused many of the estimates to be extremely erroneous. This was quite conclusively proven during the growing seasons of 1923 and 1924 in pastures Nos. 7, 8, 10 and 13 where large areas of grass tufts, of grama, aristida, Tobosa, Burro grass, Saccaton and other grasses which were presumed to be dead the season previous, put forth considerable growth under favorable conditions after two and even three seasons of extreme drouth.

It is hoped that the coming season will be favorable to good growth over this entire Reservation so that it may be possible to finish a satisfactory reconnaissance in the event that the personnel is available.

Under new projects to be established in the field the coming summer, a Tobosa dipping study will be gotten under way in June so that it will be established well in advance of the July rains. The tentative working plan for this project is included elsewhere in this report. The new project working plan for the Black Grama period study is also given herewith. Both of these project work plans are submitted for approval.

Another new project which has been considered for the coming season is the Supplementary Forage Crop Production, by means of flood irrigation in cooperation with the Bureau of Public Roads.

The tentative working plan for this project has been worked up and submitted to The Forester and Chief of the Bureau of Public Roads, but until it is finally approved by the B.P.R., it will not be considered as an active project.

Personnel:

The Supervision of the Jornada was turned over to the present director on July 10, 1924, by Mr. Nelson, who for almost five years prior to this time had been in charge of the work.

During the early part of June, Mr. Hurst R. Julian was appointed Ranger on the Jornada to take the place of Mr. Hough who was transferred to District 5 during the latter part of May. Mr. Grasovsky was appointed temporary Field Assistant for the field season and reported for duty on June 13. Through an arrangement with the District Forester in Albuquerque, Mr. Kramer was transferred to the Jornada on Oct. 17 to take the Junior Range Examiner's position held by Mr. Julian who was transferred to the Datil Forest on Nov. 22 . Mr. Grasovsky's temporary appointment terminated on Oct. 31, 1924.

SUMMARY OF DIARY
July 1, 1924 to February 9,1925

July,1924.

The cancellation of the contract and agreement with our former cooperator, Mr. C. T. Turney was formally made effective on July, 1, 1924 by the Secretary,and January 31, 1925 was set as the date on which all stock, both horses and cattle, would be required removed from the Reservation.

During the early part of July, regular inspection of the entire Reservation was made to obtain utilization data for the fiscal year 1924.

Immediately after the first rain in July, the Black Grama Period Study work was begun in Pasture No. 1 where movable panels are being used.

Two new Blue Grama quadrats were established in Pasture No. 11, and two new Black Grama quadrats were established and an enclosure built near West Well.

Towards the middle of the month, all of the cattle in Pasture No. 10 and the bulk of those in Pasture No. 2 were moved to Summer range in Pastures Nos. 1 and 13, in order to accomplish the deferring of the black grama range during the growing season.

A considerable amount of maintenance work on the Government Office Building and dwelling house was completed at odd times during the month, including painting and sundry repairs.

Mr. C. N. Smith, Director of Extension, U.S.D.A. and Mr. Kulkarni, of the British India Department of Agriculture visited the Reservation the latter part of the month.

August, 1924

On August 17, Mr. Turney removed the surplus cattle from the Reservation which had been in trespass for more than a year, and which being in violation of the contract, was one of the chief reasons for the cancellation of his agreement.

September, 1924.

Rain gauge enclosures were constructed at the South Well, West Well and Red Lake stations. The quadrats for the snakeweed study were established in Pasture No. 2.

October, 1924.

The regular fall quadrat work was begun during the first week in October. Mr. D. A. Shoemaker of the Washington Office visited the Jornada from Oct. 8, to 12, inclusive; and Mr. Chapline of the Washington Office spent the time from October 9 to 22 on his annual inspection of the Jornada.

During the latter part of October, the fall inspection of the Reservation was made for the purpose of obtaining growth and forage crop data.

On October the 25th, Mr. Oscar Coleman, a Representative of El Paso Cattle Loan Company, called at the Headquarter's Office and informed the Director that all of the Turney interests were in process of being taken over by the El Paso Cattle Loan Company and the American Trust and Savings Bank; and that the El Paso Cattle Loan Company would assume control of the private holdings on the Jornada.

The cattle feeding experiment in cooperation with the State College of New Mexico was established on Oct. 28 at South Well.

November, 1924.

The fall quadrat work was completed during the early part of November and during the course of this work all of the quadrat markers were re-located and the remaining wooden stakes, numbering about forty, were replaced by others made of one inch iron pipe. A number of old wooden quadrat stakes were also replaced with angle irons.

Mr. Nelson, formerly Director of the Jornada, visited the Reserve enroute from Arizona to Albuquerque on November 14 and 15; and Mr. Herms of the District 3 Office of Accounts visited the Las Cruces office on Nov. 16 and made an inspection of the accounts and property records.

Branding operations on the Reservation were begun on Nov. 11 and completed on Nov. 18, under the supervision of Mr. Oscar Coleman of the El Paso Cattle Loan Company.

During the last week in November, the Director visited the Santa Rita Range Reserve and spent three days with Mr. Culley in going over the projects being carried on there.

December, 1924.

Mr. Stevenson of the Datil National Forest visited the Jornada on December 5 and 6 and obtained information on the Period Study work being carried on and other projects were discussed which he was desirous of getting under way in the Datil.

On December 8, Mr. Waggner, President of the El Paso Cattle Loan Company informed the Director that the final turnover of the Turney interests on the Jornada to the El Paso Cattle Loan Company had been accomplished and that all of the cattle had been sold and would be removed from the Reservation early in January.

Mr. Culley, Director of the Santa Rita Range Reserve visited the Jornada, December 16 to 18 during which time, the projects in common to the Santa Rita and Jornada Reserves, were gone over and discussed in detail.

January, 192[illegible]

During the early part of January, the Director attended the District 3 Investigative Meeting in Albuquerque and the first day of the American National Livestock Association Convention which was being held at that time. While in Albuquerque, a conference was held with Asst. Forester Barnes, in regard to matters concerning the Jornada and the possibility of future cooperation was discussed with Mr. Boice, President of the Arizona Cattle Growers Association; and Dr. J. D. McGregor of El Paso, both of whom expressed themselves as being interested in operating on the Reservation.

The final removal from the Jornada of all the cattle, except a small remnant was accomplished on Jan 8,1925.

A new and complete set of files was installed in the Las Cruces office during January.

The lane leading to West Well from the Bar Cross Detroit Range was closed permanently to outside stock on January 12.

February 1925.

On February the 4th, the New Mexico County Agents under the direction of Mr. C. P. Monroe, visited the cattle-feeding experiment at South Well and witnessed a demonstration given by Mr. Wallace of the Bureau of Animal Indsutry, who classified the yearlings into market classes. Mr. Wallace also gave an excellent talk on marketing cattle.

The majority of Mr. Turney's horses, which have heretofore been running on the Reserve in Pasture No.11 were removed on February 9th. Two hundred and seventy-five head were gathered. The remnant of these horses will be removed as soon as conditions are favorable.

During January and February a total of seventy-seven coyotes were poisoned on the Reservation by Mr. Max Vanderstucken who was given a permit to do this work.

Summary of

Range Conditions on the Jornada Range Reserve.

Calendar Year 1924

1. Climatic Conditions:

Generally speaking, the past year has proven to be one of the worst drouth years the Jornada has experienced since 1917. This applies not only to the Jornada, but to the surrounding country in this section of the state which embraces probably five counties.

The heavy snowfall during the latter part of December 1923 did not as was hoped, be of sufficient value to cause good growth during the early spring of 1924.

January and February were dry and although some precipitation fell, it was not sufficient to cause good spring growth. The six stations on the Reservation averaged over 1/2 inch of rain during March which started some growth, but May and June were so dry that the growth which did start proved to be of no consequence. With the exception of one station near the foot hills where .11 inches of rain fell, no rain occurred during June.

The month of July was exceptional on the south third of the Reservation, where three stations averaged 3.62 inches of precipitation.

The north 2/3 of the Reservation including the mountain pasture received approximately 1½ inches, which was hardly enough to start growth well owing to the dry character of the soil. The south 1/3 of the Reservation made excellent growth during July.

The balance of the growing season on most of the Reservation was a disappointment. August and September were dry except on the south 1/3 of the Reservation where some good rains maintained the growth started in July and produced a fairly good forage crop, which, however, was mostly on summer range with the exception of one grama grass pasture. As a result, hardly more than a 25% forage crop was produced on

the winter and grama grass range.

Although some fairly good showers came during the months of October and November, and with December above the average, temperatures were so low and the soil so dry that the moisture accomplished little either in the way of causing growth or penetrating the soil.

The average for the 6 stations on the Reservation for 1924 totals 6.28 inches for the year and 4.03 inches for the growing season, which is 2.30 inches below normal for the year and .72 inches below normal for the seasonal. Of the six stations on the Reservation, two were slightly above normal for the year and the same two were slightly above for the growing season. The balance were materially below normal both as to annual and season precipitation.

This year concludes the fourth consecutive drouth year for this section of the state. This locality has gone through two periods of drouth aggregating seven years in the past ten. Of these ten years, five have been below normal, three have been approximately normal or slightly above, and two have been materially above.

As a result, the outlook for the coming year is not particularly encouraging since if only normal rainfall occurs, it will hardly be sufficient to cause the vegetation which is in a drought-stricken condition to produce an average forage crop.

The following tables show the precipitation which occurred on the Reservation during 1924, and Annual and Seasonal averages for the State College and Headquarters Jornada Range Reserve 1915-24, and other stations on the Jornada since 1918.

The accompanying maps show, in colors, approximately, the variation and local character of the rainfall over the Reservation, both for the growing season and calendar year 1924.

It is planned to establish four more rain gauges on the Reservation during the ensuing year which will enable a more accurate analysis to be made of forage and growth conditions over the Reserve as a whole.

PRECIPITATION ON THE JORNADA RANGE RESERVE 1924

1924	Headquarters	South Well	West Well	Red Lake	Ragged Tank	Ropes
JAN.	.16	.19	.11	.18	.20	.40
FEB.	.11	.07	.15	.18	.04	.13
MAR.	.51	.51	.42	.52	.76	.88
APR.	.15	0	.20	.14	.17	.36
MAY	.19	.07	.24	.20	.32	.12
JUNE	0	0	0	0	.11	0
JULY	3.34	2.81	1.40	1.58	4.72	1.83
AUG.	.32	1.17	.12	.47	1.07	3.24
SEPT.	.21	.28	.30	.55	.40	.36
OCT.	.30	.33	.28	.25	.41	.46
NOV.	.15	.43	.13	.11	.13	.25
DEC.	.42	.45	.22	.33	.70	.77
Total Seasonal	3.87	4.26	1.82	2.60	6.19	5.43
Annual	5.86	6.31	3.57	4.51	9.03	8.80

ANNUAL AND SEASONAL (JULY, AUGUST and SEPTEMBER) PRECI ITATION FOR NEW MEXICO AGRICULTURAL COLLEGE AND FIVE RAINFALL STATIONS TO SHOW VARIATION IN AMOUNT WITHIN SHORT DISTANCES.

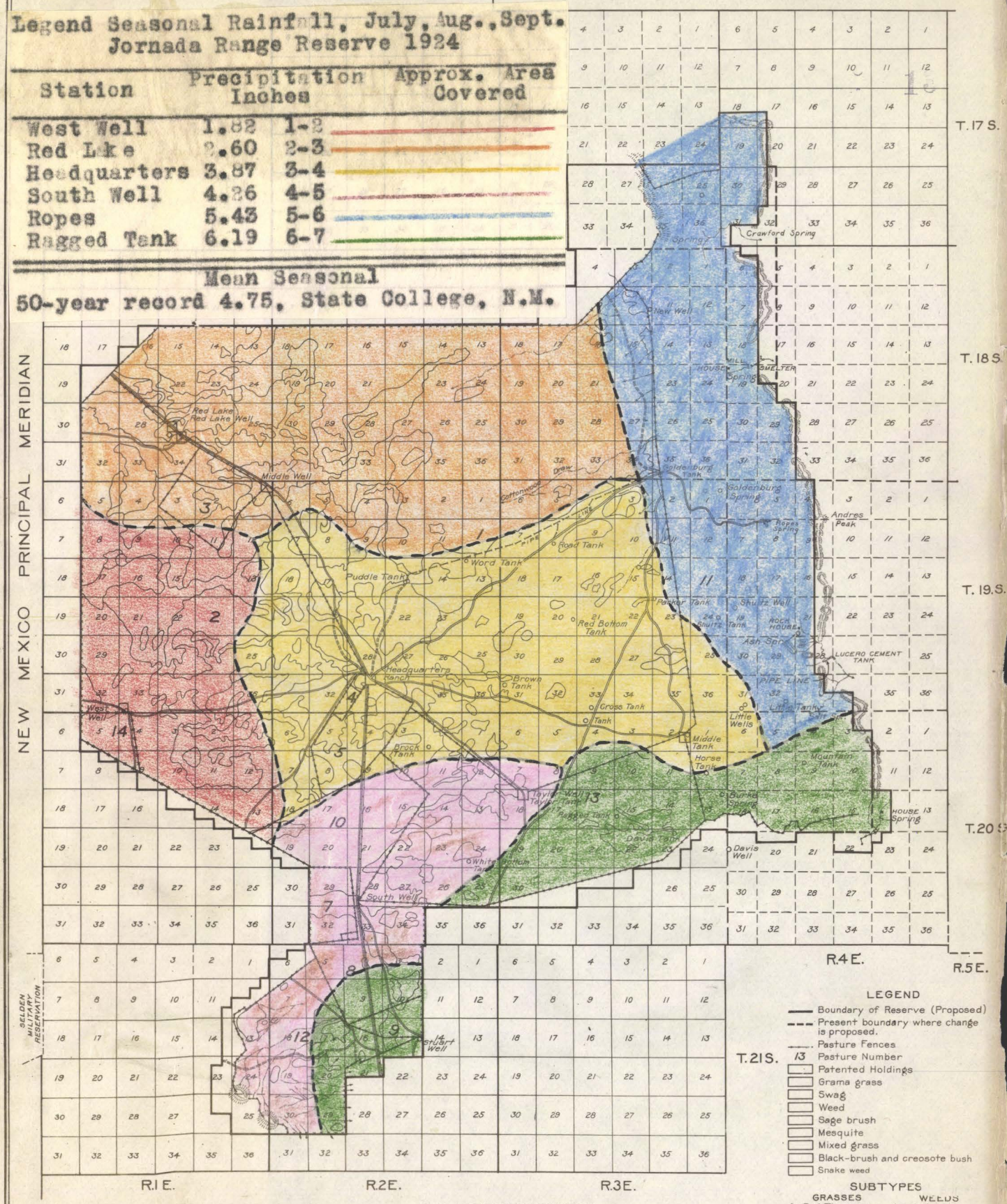
Year	Agricultural College		Turney Headquarters		South Well		West Well		Red Lake		Ropes	
	Ann.	Seas.	Ann.	Seas.	Ann.	Seas.	Ann.	Seas.	Ann.	Seas.	Ann.	Seas.
	INCHES.											
1915	7.37	4.67	7.51*	4.85	--	--	--	--	--	--	--	--
1916	7.78	2.47	8.88	2.58	--	--	--	--	--	--	--	--
1917	5.58	4.91	3.54	2.34	--	--	--	--	--	--	--	--
1918	7.23	2.71	8.76	4.41	5.47	2.39	5.87	3.16	7.06	3.68	8.89	3.70
1919	8.05	4.20	12.54	8.20	7.72	4.67	7.91	4.96	11.52	6.42	16.37	5.85
1920	8.18	3.87	12.02	5.67	10.14	5.28	13.42	7.44	9.67	4.34	11.59	5.32
1921	7.64	4.60	5.83	3.49	5.43	3.15	7.55	5.53	6.55	5.29	10.17	5.86
1922	5.58	2.82	6.69	3.18	6.46	3.69	6.29	3.12	5.96	2.86	11.02	5.24
1923	10.36	5.02	9.48	3.95	7.36	2.88	6.79	3.53	9.56	4.42	14.25	7.34
1924	4.83	3.41	5.86	3.87	6.31	4.26	3.57	1.82	4.51	2.60	8.80	5.43
Avg.	7.26	3.87	8.11	4.25	6.98	3.76	7.63	4.22	7.83	4.26	11.58	5.53

*Incomplete

Legend Seasonal Rainfall, July, Aug., Sept.
Jornada Range Reserve 1924

Station	Precipitation Inches	Approx. Area Covered
West Well	1.82	1-2
Red Lake	2.60	2-3
Headquarters	3.87	3-4
South Well	4.26	4-5
Ropes	5.43	5-6
Ragged Tank	6.19	6-7

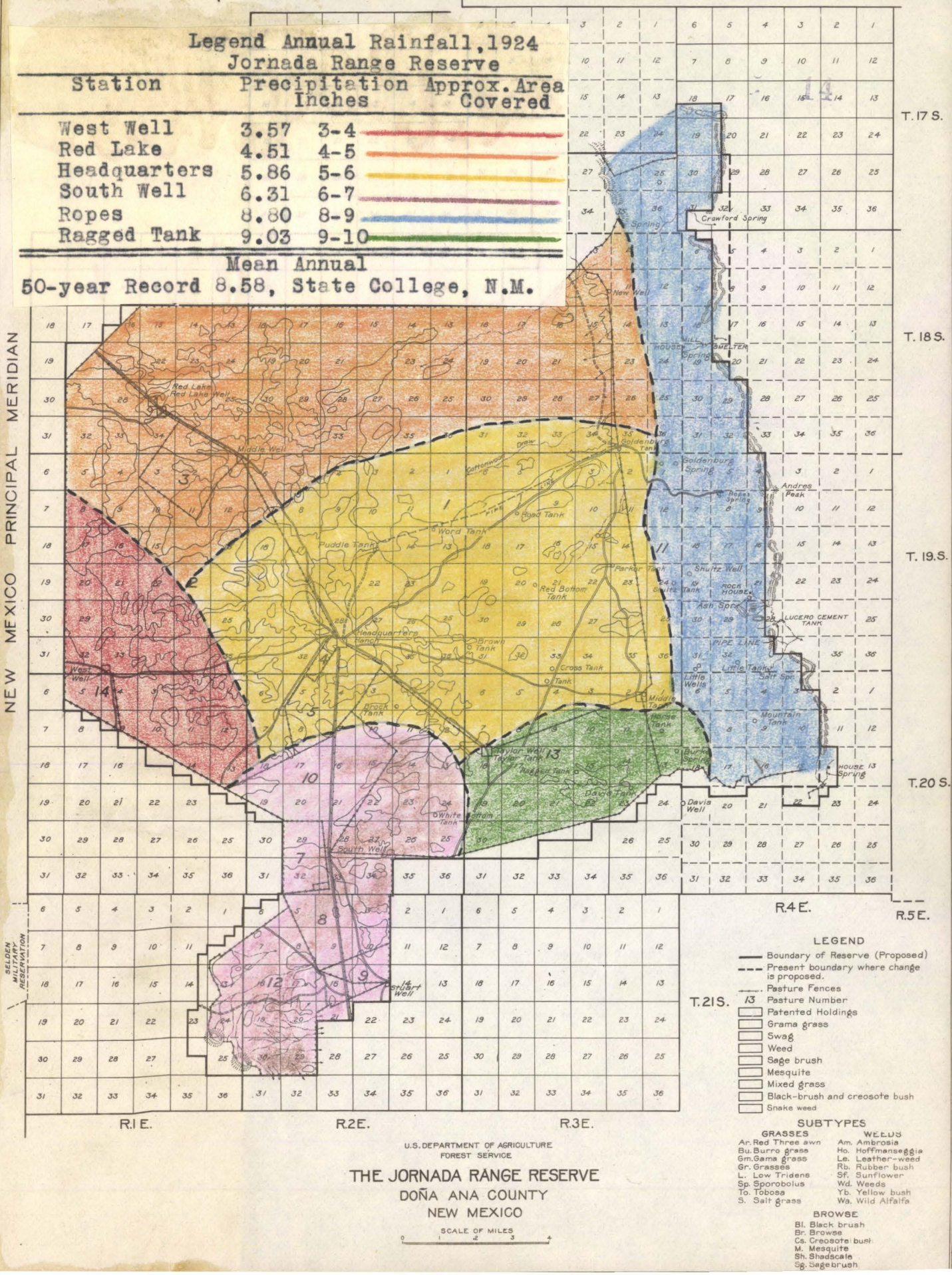
Mean Seasonal
50-year record 4.75, State College, N.M.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

THE JORNADA RANGE RESERVE
DOÑA ANA COUNTY
NEW MEXICO

SCALE OF MILES
0 1 2 3 4


Legend Annual Rainfall, 1924
Jornada Range Reserve
Station | Precipitation Inches | Approx. Area Covered
West Well 3.57 3-4
Red Lake 4.51 4-5
Headquarters 5.86 5-6
South Well 6.31 6-7
Ropes 8.80 8-9
Ragged Tank 9.03 9-10
Mean Annual
50-year Record 8.58, State College, N.M.
NEW MEXICO PRINCIPAL MERIDIAN
T. 17 S.
T. 18 S.
T. 19 S.
T. 20 S.
T. 21 S.
R. 1 E.
R. 2 E.
R. 3 E.
R. 4 E.
R. 5 E.
SELDEN HILLS RESERVATION
Red Lake
Red Lake Well
Middle Well
New Well
Crawford Spring
Goldenburg Tank
Goldenburg Spring
Andres Peak
Ropes Spring
Road Tank
Word Tank
Puddle Tank
Parker Tank
Shultz Well
Rock House
Ash Spr.
Lucero Cement Tank
Pipe Line
Little Tanks
Salt Spr.
Red Bottom Tank
Headquarters Ranch
Brown Tank
Cross Tank
West Well
Brock Tank
Middle Tank
Horse Tank
Mountain Tank
Taylor Well
Taylor Tank
Ragged Tank
Davis Tank
Davis Well
White Bottom
White Tank
South Well
Stuart Well
House 13 Spring
LEGEND
Boundary of Reserve (Proposed)
Present boundary where change is proposed.
Pasture Fences
13 Pasture Number
Patented Holdings
Grama grass
Swag
Weed
Sage brush
Mesquite
Mixed grass
Black-brush and creosote bush
Snake weed
SUBTYPES
GRASSES
Ar. Red Three awn
Bu. Burro grass
Gm. Gama grass
Gr. Grasses
L. Low Tridens
Sp. Sporobolus
To. Tobosa
S. Salt grass
WEEDS
Am. Ambrosia
Ho. Hoffmanseggia
Le. Leather-weed
Rb. Rubber bush
Sf. Sunflower
Wd. Weeds
Yb. Yellow bush
Wa. Wild Alfalfa
BROWSE
Bl. Black brush
Br. Browse
Cs. Creosote bush
M. Mesquite
Sh. Shadscale
Sg. Sagebrush
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
THE JORNADA RANGE RESERVE
DOÑA ANA COUNTY
NEW MEXICO
SCALE OF MILES
0 1 2 3 4

2.Forage Conditions:

The forage crop produced during the growing season of 1923 was such that the cattle wintered quite well and held up remarkably into the summer. No spring weed crop of any consequence occurred in the spring of 1924, but a heavy crop of soapweed blooms helped materially, so that considering conditions, only a reasonable amount of spring feeding was necessary. There was little or no grass growth of any consequence during the past spring.

Summer Range Types.

The rainfall which occurred during the growing season was instrumental in producing an excellent forage crop of the Tobosa and Black Brush types, generally over the Reservation where the growth of Tobosa, Side oats grama, Sacaton and Burro grass, which are chiefly summer and early fall forage, was perhaps better than it has been at any time during the past four years, excepting on the north end where several large types did very poorly.

Winter Range Types.

(a) Grama and Aristida Types:

The poor forage crop which was produced on these types the past growing season is due both to lack of moisture and the heavy loss in density which has taken place due chiefly to drouth.

It is doubtful if more than a 35% forage crop was produced on any of the grama or aristida types, pasture No. 10 excepted. This pasture which includes, approximately, 4800 acres, received almost normal seasonal rainfall this year and produced a very satisfactory forage crop considering the drouth-stricken condition.

With this exception, grama grass in particular, showed very poor height growth this year, while hardly more than 10% of the flower stalks headed out; in fact, few if any of the grass species on the grama and aristida types made sufficient growth to mature or cure properly on the stalk.

(b) Browse Type:

This type which includes both the mesquite sandhill and sage types received very light rains the past growing season. The mesquite bean crop was fairly good this past summer, but both summer and winter weeds which are generally fairly prolific on these areas failed to materialize this year. The sage brush in the sand hill section of the Reservation made very poor growth as compared to the three years previous, and the growth of shadscale which also occurs in these types was only fair.

The mountain section of the Reservation which is given up entirely to the use of horses and which comprises about 1/4 the area of the Reservation produced a very poor forage crop the past season due chiefly to its depleted condition.

Considering the Reservation as a whole it is estimated that the forage crop produced the 1934 growing season did not exceed ~~60~~ 50% of what it is capable of doing.

3. Condition of Cattle:

In spite of the drouth conditions which have existed on the Reservation the past year, the cattle have been maintained, generally speaking, in exceptional condition, except for a number of small calves during the late spring.

During the late winter and early spring, dry cows actually put on flesh, while the bulls and cows with calves at side held their own with few exceptions.

The late spring and early summer were particularly drouthy which caused all classes to loose in weight materially; excepting 15 bulls and about 50 cows which were fed cottonseed cake, none of the cattle lost in flesh to the extent that they were in a weakened condition. The rather heavy crop of soapweed blooms which came on at that time was largely responsible for keeping the cattle in strong condition.

After the first rains occurred in July, all of the cattle were placed in the summer pastures on Tabosa and Black brush types where by the first of August, practically all classes were shed off and in vigorous condition. By the end of September all of the cattle on the Reservation were in good flesh, but only a few dry cows, steers and heifers reached the point where they could be called grass fat.

During October the majority of the cattle showed some loss due to the fact that the summer range grasses on which they were being held had begun to lose their feeding value.

Because of the shortage of grama grass this year the cattle were necessarily held on the summer range longer than is generally the case.

During the months of November and December the bulk of the cattle were distributed over the grama and Browse types in such a way as to make the available forage go as far as possible. By the end of December the she stuff with calves and bulls had begun to show a fall-off to some extent, but dry cows and yearlings were in good shape at that time.

CS
Artificial Reseeding, Jornada
Filaree (Erodium cicutarium)

PROJECT:

Artificial reseeding of depleted range lands to forage plants.

OBJECT:

To determine the species of forage plants, foreign or native which are best adapted to grow under the varying conditions of elevation, temperature, soil and precipitation existing on Southwestern Ranges.

STATUS:

Very little work of this kind has been done on the Jornada in the past.

Due to the prevalence of extremely favorable climatic conditions during the spring of 1923, an attempt was made to reseed a small area to filaree (Erodium cicutarium) the seed of which was obtained from Tucson, Arizona. It was believed that good results were likely to occur since two species of filaree (Erodium cicutarium and and E. texanum) occur on the Jornada to a limited extent, and the same species occur to a considerable extent on a neighboring foot hill area. The results from broadcasting this seed were practically negative, only one plant being found which may or may not have been a result of the reseeding.

No attempt was made to reseed this plant during the spring of 1924 because of the exceedingly unfavorable climatic conditions which existed.

FURTHER WORK:

It has been decided to discontinue this project for the present or at least until another favorable spring growing season occurs. In making another attempt to reseed an area with this plant, it is believed that the seed

should be harrowed or dragged into the soil in some manner so as to create better germinating conditions and hasten the growth.

USE OF RESULTS:

Application to similar range in the Southwest.

DATE OF COMPLETION:

Continued as minor project until more definite results have been obtained as to the success or failure of this practice.

GS
Artificial Reseeding, Jornada
Exotic Tree Species
Chinese Pistache
Chinese Elm
Evergreen Tamarisk

PROJECT:

The introduction of drouth resistant tree species on Southwestern Range lands.

OBJECT:

To determine the species of trees best adapted to grow under the varying conditions encountered in South Central New Mexico for the purpose of providing a means of retarding the drifting of sand on depleted range areas and also for the purpose of providing wind breaks and shade trees.

STATUS:

In the spring of 1923, three species of trees were secured from the Plant Introduction Service Bureau of the Bureau of Plant Industry: 50 seedlings of chinese Pistache (Pistacis chinensis), 20 seedlings of Evergreen tamarisk (Tamarix aphila (articulata) were secured from the Plant Introduction Garden at Chico, California, and 200 seedlings of Chinese Elm (Ulmus pumila) were procured from Bellingham, Washington.

Most of these plants were set out at the Headquarters of the Jornada Range Reserve. The Pistache and the Tamarisk were set out on March 3 and the Elm on March 6. The plants have been watered regularly whenever the moisture conditions were not favorable to growth.

At the close of the 1923 growing season the following results were obtained:

1923 Results.

Species	Number Planted	Number Living	Per Cent Alive	Av. Growth Height
Chinese Pistache	53	19	35.8	3 inches
Chinese Elm	175	68	38.8	5 inches
Evergreen Tamarisk	20	1	5.0	1 inch

Note: It was thought that all of the Evergreen Tamarisk seedlings died, but one was found to have lived at the end of the 1924 growing season.

At the end of the 1924 growing season the results were as follows:

1924 RESULTS.

Species	Number Planted	Number Living	Per Cent Alive	Ave. Growth Height	Ave. Growth [illegible]
Chinese Pistache	53	5	9.5	6"	2"
Chinese Elm	175	24	13.7	35"	6"
Evergreen Tamarisk	20	1	5.0	15"	6"

Note: Two individuals of the Chinese Elms planted near a leaky drain pipe have reached a height of 64 inches with a diameter at the root collar of about one inch. The subsoil in which these 2 individuals are growing is moist a good portion of the time.

It is reasonable to assume that the plants would have all succumbed because of the drouth conditions which have prevailed during the past two years, had they not been irrigated, especially, during the critical spring period.

It is doubtful if the planting of these species would meet with any degree of success for purposes other than shade or ornamental, unless it was possible to furnish considerable irrigation.

FURTHER WORK:

No further planting of this kind is contemplated, except that possibly some native shrubs or trees found in the sand hills may be set out around the buildings at Headquarters for ornamental or wind break purposes.

It is recommended that observations be continued on the remaining plants of the three species already planted in order to determine the per cent of survival and the rate of growth.

USE OF RESULTS:

For recommendation where planting is contemplated under similar conditions.

DATE OF COMPLETION:

Project closed October 1924

COMPILATION SHEET CLIPPING STUDY DATA

Series No. JORNADA RANGE RESERVE Species

Year / Months	Quadrat Number: Area Chart	Dry Gms.	Gms. per sq. dcm.	Flower Stalks Average No.	Leaves Avg. Length	Quadrat Number: Area Chart	Dry Gms.	Gms. per sq. dcm.	Flower Stalks Average No.	Leaves Avg. Length	Quadrat Number: Area Chart	Dry Gms.	Gms. per sq. dcm.	Flower Stalks Average No.	Leaves Avg. Length	Quadrat Number: Area Chart	Dry Gms.	Gms. per sq. dcm.	Flower Stalks Average No.	Leaves Average Length
Growth Started																				

G. S.
Period Studies, Jornada
Black Grama

PROJECT WORKING PLAN

PROJECT:

Period Study of Black grama on southern New Mexico ranges.

OBJECT:

To determine the proper season of use of this type of range in order to secure the highest productivity and the factors which most affect the maintenance of this type of range in this condition.

STATUS:

This project was established in the field at the beginning of the 1923 growing season. Nine (9) removable enclosures were used during the season of 1923 which were divided into 2 sets of 4 each. Both sets were handled in the same manner, except that the enclosures on one set were left open the balance of the year to represent protection during the growing season with over utilization at the end of the grazing year. The second set was closed after being properly grazed. The 9th enclosure was used as a check, being permanently closed. In each enclosure a chart quadrat 1x1 metre and a list quadrat 1x5 metres was laid out. Flower stalk counts and height measurements were taken on each quadrat both list and chart at the time of opening and the quadrats were clipped for the purpose of determining the amount of growth and forage produced under each condition. The quadrats were charted and listed twice, once when established and once at the close of the growing season.

The four enclosures in each set were opened as follows:

One, 30 days after growth started, one at the end of the growing season, and one 110 days after growth started, the latter to represent winter conditions at time of opening.

The tentative results as given in the 1923 Investigative Report are as follows: (a) Early grazing reduced the flower stalk production, final height growth and forage production. (b) The maximum number of Black grama flower stalks were produced during the first month of the growing season.

During the season of 1924 a number of changes were made in the procedure of the work, namely: the list quadrats were done away with, and the set of four enclosures representing yearlong grazing was eliminated and only two quadrats were retained to represent yearlong grazing with over utilization at the end of the grazing year for the purpose of comparison with those in the enclosures. The enclosures were opened after growth started as follows; one--15 days, one--30 days, one--60 days, and one--90 days. A fifth enclosure for a check was not opened. Flower stalk counts and height measurements were taken on the quadrat in each enclosure at the time of opening, and the quadrats were clipped to determine the amount of forage produced. The quadrats were also charted at the end of the growing season and detailed notes were taken both at the time of opening the enclosures and at charting.

Flower stalk counts and height measurements were also made on the two quadrats subject to grazing yearlong and chartings and detailed notes were made at the end of the growing season.

The results at the end of the 1924 growing season are as follows:

Number of flower stalks, average height growth and weight of forage produced by Black grama under continued use with over utilization at end of grazing year, compared with same under different periods of protection with proper utilization.

Quadrat	P.S.G. 2	P.S.G. 4	P.S.G. 5	P.S.G. 6	P.S.G. 7	P.S.G. 8	P.S.G. 9
Type of Use	Yearlong: No. Protection	Yearlong: No. Protection	Protected 15 days and properly utilized	Protected 30 days and properly utilized	Protected 60 days and properly utilized	Protected 90 days & properly utilized	Protected Yearlong
Time of counts & Measurements	End of growing season	End of growing season	15 days growth	30 days growth	60 days growth	90 days growth	90 days growth
No. of flower stalks per sq. dcm.	15.5	23.9	52.7	33.7	56.1	101.2	88.6
Average Ht. of flower stalks	5.6	12.9	5.6	5.8	12.2	11.7	10.7
No. Hor. Flower stalks per sq. dcm.	8.0	11.7	27.4	4.7	2.5	2.7	2.0
Average length Hor. Flower Stalks	15.3	20.7	13.8	12.8	23.0	15.7	22.0
Forage produced per sq. dcm. Dry weight in grams.			2.9	1.2	5.8	5.4	Not clipped.
Precipitation Growing Season	3.87	3.87	3.04	3.46	3.66	3.87	3.87
Precipitation % recd. ea. pd.	100.	100.	78.5	89.3	94.6	100.	100.

Note; Rodents affected height growth materially in P.S.G. [illegible] 8& 9.

- A N A L Y S I S -

Flower Stalks:

The number of flower stalks produced per sq. decimeter of black grama tuft on the area protected for 15 days and properly utilized the year previous is from 2 to 3 times the number at the end of the growing season on like areas not protected and over-utilized. When protected from 60 to 90 days and properly utilized the year previous, the number of flower stalks per sq. dcm. may be as much as 3 to 5 times as many as those produced on the areas that received no protection and were over-utilized.

Height Growth:

The height growht on the areas grazed yearlong did not seem to be so materially affected as compared with the areas protected, although one quadrat not protected showed the same height growth at the end of the growing season as one protected for only 15 days, while the second unprotected quadrat showed a slightly higher height growth at the end of the growing season than did any of those protected.

Growing conditions were excellent during the first 15 days after growth started since 78.5% of the seasonal precipitation fell during that time. The balance of the growing season was very droughty. Under those conditions, it would occur that protection during the growing season tends to produce a larger number of flower stalks per sq. dcm. of vegetation, but affects the ultimate height growth only to a limited extent. Competition being keener on the protected areas where more flower stalks are present, a limited amount of precipitation during the greater part of the growing season , is likely to produce a somewhat better height growth on the unprotected areas where the number of flower stalks is much less.

Horizontal Flower Stalks or Runners:

The unprotected quadrats produced a larger number of horizontal flower stalk at the end of the season than did the protected quadrats. The protected quadrats showed a considerable number of horizontal flower stalks at the beginning of the season, but as the season progressed they diminished in number. At the end of the season the two quadrats which received protection for 90 days showed only

2 and 2.7 horizontal flower stalks, respectively, per sq. dcm.while the unprotected plots showed 8.0 and 11.7 runners per sq. dcm. The average length of the runners on the unprotected plots was practically the same at the end of the growing season as those on protected plots.

Under the conditions which existed, it would seem that while being grazed during growth, trampling might tend to increase the number of horizontal flower stalks produced through injury.

Volume of Forage Produced Resulting from Clipping:

Slightly more than one-half the forage produced on the quadrat protected during the 3 months growing season as was produced on the quadrat protected 5 days after growth began. The amount of forage produced after the first 15 days would have been much greater if growing conditions had been similar to those which existed during the first 15 days after growth started. The data shows that there was practically no volume growth after the first 60 days, since the amount clipped from the quadrat protected 60 days was virtually the same as that from the plot protected 90 days.

Since clipping in this experiment brings in an artificial factor on the protected plots which does not exist on the unprotected plots, it has been decided to eliminate the clipping on this project in the future.

PERIOD STUDY BLACK GRAMA

Quadrats P.S.G. 1 to 9 inclusive.

P.S.G.	Seasonal Use	Type of Grazing	Sq. cms. Fall 1923	Sq. cms. Fall 1924	Increase Sq. cms.	Increase %	Decrease Sq. cms.	Decrease %	Remarks
1	Opened after 15 days	Over-grazed	314	341	27	8.6			
2	Opened after 30 days	"	321	187			134	41.7	
3	Opened after 90 days	"	316	298			18	5.7	
4	Opened after 110 days	"	263	171			92	35.0	
5	Opened after 15 days	Properly Grazed	183	153			30	16.4	
6	Opened after 30 days	"	342	418	76	22.2			
7	Opened after 90 days	"	198	364	166	83.8			
8	Opened after 110 days	"	264	263			1	0.4	Affected by Rodents
9	Not Opened	Not Grazed	265	351	86	32.5			Affected by Rodents

Effect of Season and Intensity of Use on Black Grama:

A comparison of the quadrat data for the years 1923 and 1924 brings out the following indications as affected by different season and intensity of use on the several quadrats during the grazing year beginning July 1,1924.

1. Opening an area to grazing 15 days after growth starts is apt to result in reducing the black grama even though it is properly grazed.

2. Later opening of the season up to the close of the growing period tends to favor an increase in stand especially of black grama if range is not overgrazed.

3. Later opening of the season up to the close of the growing period, but with overgrazing during or at the end of the grazing year may tend toward or approach maintenance of stand.

4. Losses in black grama on areas opened to grazing 15, 30 and 90 days after growth started and left open the balance of the year were undoubtedly due to overgrazing during the grazing year 1923-24 rather than improper seasonal use during the growing season 1923, since areas opened at the same time, but which were closed after proper use had been obtained showed increases or maintenance of stand.

FURTHER WORK:

This project will be continued along the same lines as in 1924 on the same ground but with clipping eliminated.

USE OF RESULTS:

Application to similar range in the Southwest, with alterations so that the principles involved may be adapted to varied conditions.

DATE OF COMPLETION:

To be continued until certain definite repeated results bring out definite trends in the several systems of management.

G.S.
Natural Revegetation, Jornada
Special Studies
Snakeweed 1924

PROJECT:

Snakeweed study on black grama type range.

OBJECT:

To determine the outcome of competition between snakeweed and black grama on black grama type range; whether or not the black grama will eventually kill out or suppress the snakeweed or vice-versa, under partially deferred grazing.

STATUS:

This project was established in the field July 14, 1924. The area on which the study plots were established is a typical black grama type in Pasture 2 about one mile southeast of West Well. There has been a decided increase in snakeweed on this area, particularly the past two years, although some small portions of the area have undoubtedly supported snakeweed for a number of years at present there is a rather heavy stand of young snakeweed seedlings on areas which heretofore have been free from snakeweed.

Whether or not the increase in snakeweed is due entirely to the severe drouth the past two or three years, is problematic. Short periods of heavy grazing during growth have probably encouraged the increase of snakeweed to a certain extent.

METHOD OF STUDY:

This study will be based on the results obtained on three 1x3 metre quadrats and on observations on the surrounding area. It is planned to chart these quadrats, but once every three years at the end of the growing season.

As a general rule, snakeweed plants have been found to be quite uncommon in black grama areas where the grass density is in the neighborhood of 2/10 or better.

Drouth seems to be more or less of a determining factor with respect to the increase of snakeweed on black grama areas. Numerous areas in Pastures 2 and 10 where the black grama and other associated grasses have been killed by drouth show an increase in snake weed. Many snakeweed seedlings have shown up on grama types the past two years which have heretofore been practically free of snakeweed. Apparently the heavy grama reduction by drouth has made it possibly for the snakeweed to come in because of lack of competition.

It has been more or less difficult to find healthy snakeweed plants on areas where the grama has made good growth this year. The heaviest snakeweed stands have invariably been found where black grama aristida and other grasses common to the black grama type have been either tramped out by overgrazing, or killed by drouth.

Numerous observations show that snakeweed seedling put forth a surprisingly rapid root growth and development very much in contrast to that made by the plant above grown.

Many seedlings averaging 4" high showed roots 17" long. Where Caliche lies within 16 or 18" of the soil surface, the roots of even small seedlings were found to extend into the Caliche 3" to 4" where the Caliche is broken up more or less by root extension through cracks and between large particles. Where the Caliche forms a more compact strata, the snakeweed roots were found to either curl up when the Caliche was reached, or else change direction more or less parallel to the stratification.

The presence of Caliche or hard pan close to the soil surface apparently does not prevent a more or less normal root development in most cases.

The average roots seemed to be about 24" in length even where considerable Caliche was encountered.

As a general rule, well developed black grama roots seldom reach farther below the soil surface in good soil more than 10" or possibly 12", the average being close to 8 inches.

A considerable amount of excavating showed that on areas where grama density approaches 2/10, a considerable amount of intermingling of roots of adjoining grama tufts takes place due to the horizontal spread of the grama roots 4" to 6" beneath the soil surface. Such being the case, it would seem that snakeweed

would under these conditions have little opportunity for growth and development, except when extreme moisture conditions occurred because of lack of available moisture below 8" or 10" beneath the soil surface since the grass roots would draw its moisture from this locality. It would therefore, seem that snakeweed will not under average growing conditions stand competition with black grama on types having a density of 2/10 or more. Snakeweed seems to thrive best on areas where the better grasses and palatable vegetation has been thinned and where the competition is not so keen. This, however, does not seem to hold true on some Tobosa and black brush types on the Reservation, where the upper layer of soil is of a clayey character and densities as high as 3/10 to 4/10 exist. In some instances, snakeweed has been found in a flourishing condition with Tobosa and Saccaton completely surrounding it and extending up through the snakeweed foliage. Under such conditions, competition has apparently little to do with the existence of snakeweed, presumably, because of the presence of more available moisture in the heavier soils found in these types.

This condition, however, has not been found to exist on grama types on the Reservation, presumably because of the lack of available soil moisture in the soil below the grass roots, the soil being most generally sandy on all grama types. Towards the close of the past summer it was noted that there were numberous spots in the snakeweed infested area where the snakeweeds were apparently, in an unhealthy condition and numbrous plants seemed to be dying from some cause or other.

Whether or not these plants are dying from old age, is, as yet, undetermined. There is a possibility that many mature plants may have been attacked by beetles and borers in the roots which caused them to die, but since many plants were found with diseased and decayed roots in which borers or beetles were not present, the beetle infestation can not be responsible for killing all of the plants. Several samples of this beetle were sent to the Washington office, all of which were lost in transit. When the last attempt was made to collect more of thie beetle, it was found that they had disappeared. It is planned to collect more of these beetles the coming summer, if they are again present, and determine just what effect they are apt to exert on snakeweed infested areas.

It was found that few if any snakeweed plants above 12" high had root systems that were not diseased and showed decay. One area of about 1½ sections in Pasture 2 shows the roots of most of the mature snakeweed plants infested with beetles. However, no small snakeweed plants were found that showed the presence of borers or beetles in the roots.

After the first year listing will be made every year to determine roughly the changes in areas. It is hoped that two or three years' results will bring out the trend of succession.

In addition to the quadrat work, a study of the root system of both black grama and snakeweed has been started in order to ascertain if root competition is a determining factor. A number of bisects have already been excavated and the accompanying photographs were taken showing the character of the root system.

No results will be available on this project before another year, or possibly longer.

FURTHER WORK:

To be continued as outlined in the project working plan.

USE OF RESULTS:

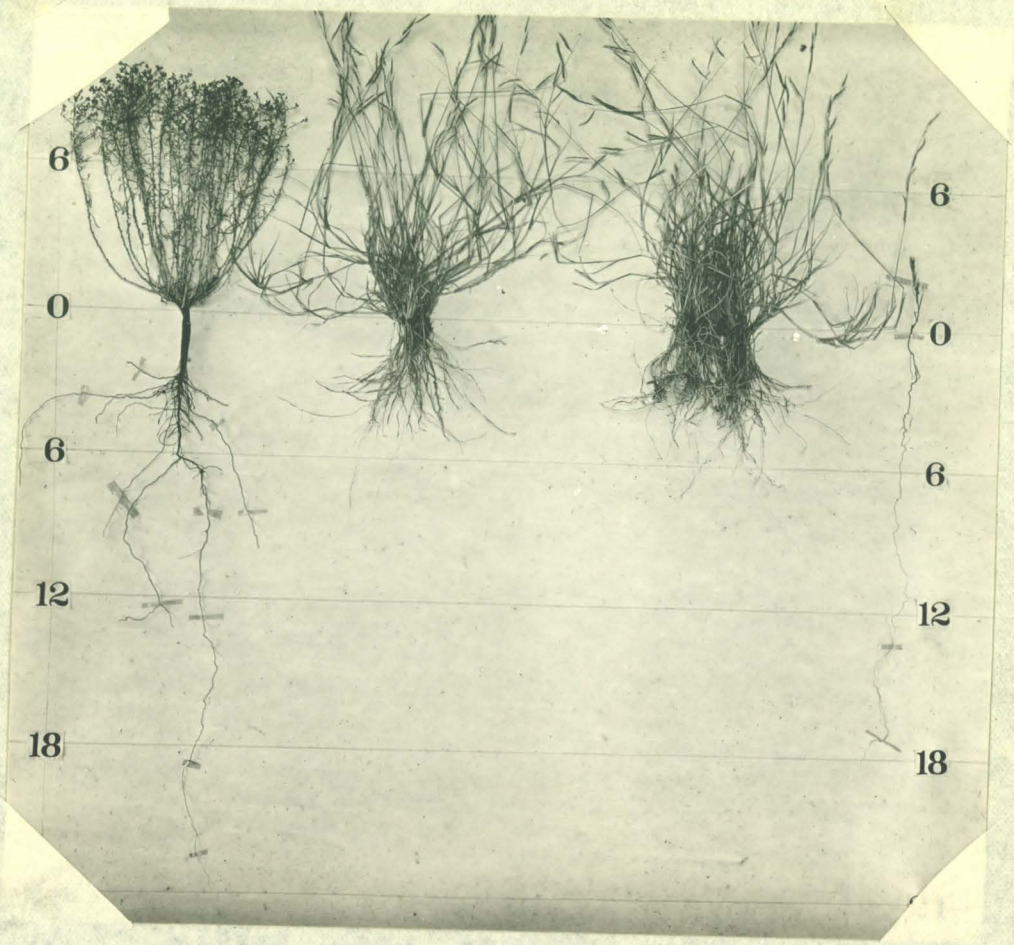
Application to like areas in the Southwest.

DATE OF COMPLETION:

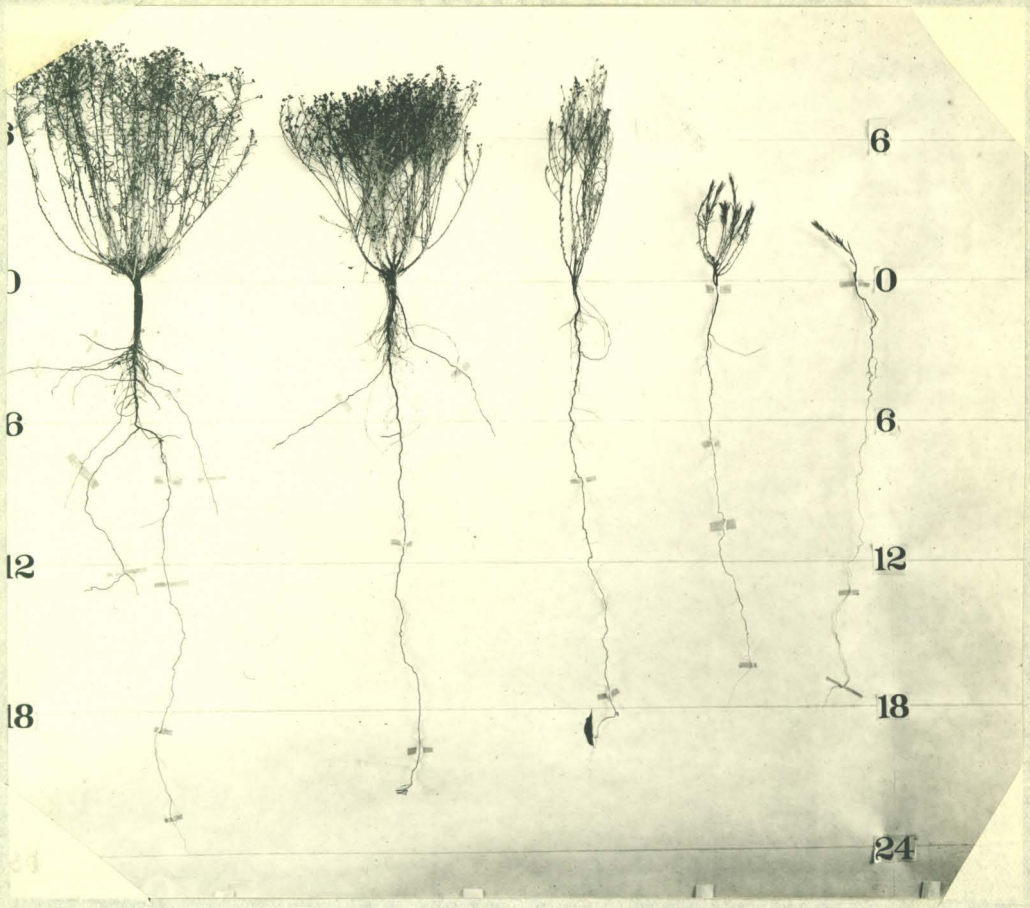
When the object of the project has been determined specifically for this type of range.

Bisect in Black grama range type, Pasture No. 2, Jornada Range Reserve, showing root systems of Snakeweed,(Gutierrezia sphaerocephala) and Black grama, (Boutelous eriopoda) compared.

Bisect in Black grama range type. Pasture No. 2
Jornada Range Reserve, showing root systems of Snakeweed,
(Gutierrezia sphaerocaphala) and Black Grama,
(Bouteloua eriopoda), compared.



Root systems and flower stalks of Black grama, (Bouteloua eriopoda) and Snakeweed, (Gutierrezia sphaerocaphala) compared.



Snakeweed plants, (Gutierrezia sphaerocaphala) showing stages of development from seedlings to mature plants.

GS
Special Project, Jornada
Period Study Black Grama

PROJECT WORKING PLAN
Revised October, 1924

PROJECT:

Period Study Black Grama.

OBJECT:

To determine the proper season of use of Black Grama; (1) the effect grazing during growth has upon height, growth and flower stalk production; (2) the effect grazing during growth has upon the tuft area maintained on the ground.

STATUS:

This project was established in the field during the growing season of 1923. The results and manner in which this project has been carried on are given in the 1923-24 Project Reports.

Beginning with the growing season 1925, this project will be changed to conform with the following plan.

PROCEDURE:

The following quadrats will be used; P.S.G. 2, 4, 5, 6, 7, 8 and 9. All others will be abandoned.

No clipping will be done.

Outside quadrats P.S.G. 2 and 4 will continue to be used as grazed yearlong.

Quadrat P.S.G. 5 will be opened 15 days after growth starts and closed when properly utilized.

Quadrat P.S.G. 6 will be opened 30 days after growth starts and closed when properly utilized.

Quadrat P.S.G. 7 will be opened 60 days after growth starts and closed when properly utilized.

Quadrat P.S.G. 8 will be opened 90 days after growth starts and closed when properly utilized

Quadrat P.S.G. 9 will remain enclosed the year round as a check.

Proper utilization, should be based on 65% use of the bulk of the Black grama foliage or that part taken 1½ inches above the ground.

Notes and Data to be Collected.

One composition write-up including growth will be made of each enclosure at the time of opening and a second will be made at the time of closing. The latter should show utilization of each species in detail including percentage taken and height left on the ground.

Flower stalk counts and height measurements of black grama only will be taken at the time each enclosure is opened. No differentiation will be made between horizontal and verticle flower stalks.

Charting.

Each of the seven quadrats will be charted at the close of the growing season and a supplementary write-up made at that time.

Compilation of Data;

Compile quadrat data, flower stalk counts and height measurements in the same manner and form as that in 1924 Project Report.

GS
Special Projects, Jornada
Clipping Study Tobosa

Project Working Plan.

PROJECT:

Tobosa (Hilaria mutica) clipping study.

OBJECT:

To determine, (1) proper degree and seasonal use (2) the effect of frequent clipping at varied intervals on the forage production, (3) whether or not Tobosa has the characteristic of true turf former.

STATUS:

This project will be established in the field during the coming June well in advance of the growing season on a typical pure Tobosa type in Pasture No. 9.

PROCEDURE:

The field work will be confined to one enclosure, approximately 50 feet square.

There will be two sets of one metre quadrats to be clipped; Set No. 1, will be clipped 2 inches above the ground; Set No. 2, will be clipped 4 inches above the ground.

Each set of quadrats will be clipped as follows:

Quadrat No. 1, clipped at weekly intervals.
" No. 2, " " two-week " .
" No. 3, " " monthly "
" No. 4, " " close of season.

Clipping will begin one week after growth starts. Dry weights only will be recorded.

CHARTING

Each quadrat will be charted at the close of the growing season in the fall of each year as long as the study in continued.

PREPARATION OF THE QUADRATS BEFORE CLIPPING:

All quadrats will be clipped to 2 inches above the ground at time of establishment before growing season begins. A border 18" wide will be maintained clipped to 1" above the ground to prevent outside influence.

NOTES:

A record will be kept of the following points. Time of start of growth of each quadrat. Average height growth at time of clipping. Flower stalk counts and leaf and height measurements will be made at the regular clipping intervals on a one decimeter strip only.

After each clipping is accomplished, the data will be recorded on the compilation sheet, a copy of which is attached hereto.

In addition to the foregoing, bisects will be made in a typical pure Tobosa type and photographs will be taken and a study of the root systems made in an endeavor to determine if Tobosa has the charasteristics of a true turf former.

GS
Carrying Capacity, Jornada
Fiscal Year 1924

PROJECT:

Carrying Capacity of semi-arid range in Southern New Mexico.

OBJECT:

To determine the Carrying Capacity of semi-arid range in Southern New Mexico and the influence of the many factors affecting it.

STATUS:

Seven years data on the Carrying Capacity of the Jornada have already been published, which show quite conclusively that in this section of the southwest, reductions of as much as 50% may be necessary, due to the extreme drouth conditions which occur at more or less regular intervals.

Where such reductions have been made, ranges carry more stock over a period of years, as well as during periods of drouth. During favorable years these ranges recuperate quicker and are in better condition to carry stock. This has been made possible on the Jornada to a great extent by practising deferred grazing on grama type range. On adjoining ranges of similar type, yearlong stocking has caused serious depletion under the same conditions, resulting in the necessity of the complete removal of stock.

FURTHER WORK:

The data that have been collected on the Jornada during the past nine years are being recompiled for the purpose of being analyzed in a more fundamental manner to better determine the effect of the many factors influencing carrying capacity on this and similar type range.

The summary sheet of the Jornada Carrying Capacity data, together with the forage crop and utilization for the same period for the fiscal year 1924 are included herewith, worked up in new form, with a short discussion. A table is also included showing the number of stock carried in the Jornada 1916-24 inclusive.

DATE OF COMPLETION:

Continuous.

USE OF DATA:

For practical application on similar range in this part of New Mexico.

Carrying Capacity, 1924

The forage crop table and accompanying map made up from ocular estimates show the approximate condition of the several pastures on the Reserve at the close of the 1923 growing season.

The most noticeable feature, perhaps, is the spotted character of the growth which was caused by the local character of the rainfall and the heavy reduction in grass density due to extreme drouth conditions since 1922.

The utilization table and map made up from ocular estimates, likewise, illustrate the condition of the several pastures on the Reservation at the close of the Fiscal or Grazing year 1924.

The Summary Sheet on Carrying Capacity shows the actual number of stock carried in the several pastures on the Reserve as a whole and for the Reserve less Pasture No. 11.

The Carrying Capacity--surface acre and forage acre figures are based on an estimated utilization of 100%. It will be noted that the forage acre figures are, in several cases, considerably below the figure of 9.6 forage acre per head per year, which is ordinarily used for administrative purposes.

These data, of which the figures are a result, was the outcome of a tentative extension reconnaissance made in the fall of 1923, attempting to show the heavy reduction in forage acres due to the extreme drouth of 1922.

These figures are, undoubtedly, too low because the data was collected too late in the season, and also because considerable difficulty was experienced in applying palatability figures in working up the data; the vegetation being in many cases in a badly depleted condition.

Forage Crop

JORNADA RANGE RESERVE

1923

Pasture Number	Area	% of Area	Estimated F. C. %	Forage Crop Equivalent	Remarks
1	74.714	37.0	70	25.9	Yearling Range
2	33.775	16.7	60	10.0	Primarily, Winter Range
3	2.410	1.2	60	0.7	" " "
5	2.815	1.4	65	.9	Yearlong Range General Utility Pasture
7	1.450	0.7	70	.5	Yearlong Range
8	4.030	2.0	65	1.3	Summer Pasture
9	784	0.4	75	.3	Summer Pasture
10	4.805	2.4	40	1.0	Winter Pasture
11	52.397	25.9	60	15.6	Yearlong Pasture
12	7.049	3.5	70	2.4	Winter Range
13	17.001	8.4	65	5.5	Summer Range Type
14	770	0.4	60	.2	Winter Range Type
Totals	202,000	100.0	65	64.3	

FORAGE CROP 65%

Table to accompany Forage Crop Map
Forage Crop figures to nearest 5%
Factor for each pasture to nearest 1/10

FORAGE CROP

Growing Season 1923

JORNADA RANGE RESERVE

Showing Forage Crop Produced, growing season 1923.
Areas and figures show Estimated Forage Crop in Per Cent.

NEW MEXICO PRINCIPAL MERIDIAN

SELDEN MILITARY RESERVATION

R.1 E. R.2E. R.3E. R.4 E.

T.21S.

Red Lake
Red Lake Well
Middle Well
Cottonwood Draw
Goldenburg Tank
Goldenburg Spring
New Well
MILL HOUSE
SMELTER Spring
Crawford Spring
Spring
Andres Peak
Rones Spring
Road Tank
Word Tank
Puddle Tank
Parker Tank
Shultz Well
Shultz Tank
Red Bottom Tank
ROCK HOUSE
Ash Spring
LUCERO CEMENT TANK
PIPE LINE
Headquarters Ranch
Brown Tank
Cross Tank
Little Wells
Little Tanky
Salt Spr.
Middle Tank
Horse Tank
Mountain Tank
Brock Tank
Taylor Well
Taylor Tank
Ragged Tank
Burke Spring
Davis Tank
Davis Well
White Bottom Tank
South Well
West Well
Stuart Well

Growth spotted
Forage Crop
Approximately 60 %

LEGEND

- Boundary of Reserve
- Present boundary is proposed.
- Pasture Fences
- 13 Pasture Number
- Patented Holding
- Grama grass
- Swag
- Weed
- Sage brush
- Mesquite
- Mixed grass
- Black-brush and
- Snake weed

SUBTYPES

GRASSES

Ar. Red Three awn
Bu. Burro grass
Gm. Gama grass
Gr. Grasses
L. Low Tridens
Sp. Sporobolus
To. Tobosa
S. Salt grass

BROWSE

Bl. Black br
Br. Browse
Cs. Creosot

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

THE JORNADA RANGE RESERVE
DOÑA ANA COUNTY
NEW MEXICO

SCALE OF MILES
0 1 2 3 4

UTILIZATION

Fiscal Year 1924

JORNADA RANGE RESERVE

Showing Utilization of the 1923 Forage Crop. Areas and figures show Estimated Utilization in Percent.

NEW MEXICO PRINCIPAL MERIDIAN

SELDEN MILITARY RESERVATION

T.21S.

R.1E. R.2E. R.3E. R.4E.

Red Lake Red Lake Well
Middle Well
West Well
Puddle Tank
Word Tank
Road Tank
Cottonwood Draw
Goldenburg Tank
Goldenburg Spring
Ropes Spring
Andres Peak
New Well
Crawford Spring
Spring
MILL
HOUSE
SMELTER
Spring
Parker Tank
Shultz Well
Shultz Tank
ROCK HOUSE
Red Bottom Tank
Headquarters Ranch
Brown Tank
Brock Tank
Cross Tank
Tank
Middle Tank
Horse Tank
Little Wells
Little Tanky
Salt Spr.
Mountain Tank
Taylor Well
Taylor Tank
Ragged Tank
Burke Spring
Davis Tank
Davis Well
White Bottom Tank
South Well
Stuart Well
LUCERO CEMENT TANK
PIPE LINE

Accessible Portions Utilized 115 %

No Utilization

LEGEND

- Boundary of Reserve
- Present boundary is proposed.
- Pasture Fences
- 13 Pasture Number
- Patented Holding
- Grama grass
- Swag
- Weed
- Sage brush
- Mesquite
- Mixed grass
- Black-brush and
- Snake weed

SUBTYPE

GRASSES

Ar. Red Three awn	Ar
Bu. Burro grass	Ho
Gm. Gama grass	Le
Gr. Grasses	Ri
L. Low Tridens	St
Sp. Sporobolus	W
To. Tobosa	Y
S. Salt grass	W

BROW

Bl. Black b
Br. Browse
Cs. Creosot

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

THE JORNADA RANGE RESERVE
DOÑA ANA COUNTY
NEW MEXICO

SCALE OF MILES
0 1 2 3 4

UTILIZATION

JORNADA RANGE RESERVE.

Fiscal Year 1924

Pasture	Area	% of Area	Estimated Utilization %	Utilization Factor	Remarks
1	74,714	37.0	100	37.0	Area showing 65% Utilization under-utilized, due to lack of stock water 80% Util. at Red Lake due to same cause
2	33,775	16.7	100	16.7	Pasture chiefly winter range type. Over-utilization West Well due to heavy use during growing season.
3	2,410	1.2	95	1.1	Pasture chiefly winter range type.
5	2,815	1.4	105	1.5	General utility pasture, chiefly Winter Range Type. Subject to heavy use during growth.
7	1,450	0.7	60	.4	Pasture deferred for winter feeding. Contains both winter and summer range types.
8	4,030	2.0	115	2.3	Pasture deferred for winter feeding. Contains chiefly summer type range, improper use.
9	784	0.4	75	0.3	Pasture deferred for winter use. Contains chiefly summer type range. Improper use.
10	4,805	2.4	105	2.5	Winter range type. Deferred until December.
11	52,397	25.9	115	29.8	Pasture uncontrolled, grazed by co-operators horses and numerous outside stock, both cattle and horses.
12	7,049	3.5	25	.9	Not fully utilized because range too rough and inaccessible.
14	770	.4	110	0.4	Winter range type used for holding trap.
13	17,001	8.4	60	5.0	Under-utilized stocked during winter and spring. Chiefly, summer type range.
Total	202,000	100.0	100	97.9	Mesa portion of Reserve, excluding Pasture No. 11 shows, approximately 95% utilization.

Table to accompany Utilization Map. Utilization figure to nearest 5% Factors for each pasture to nearest 1/10.

SUMMARY SHEET CARRYING CAPACITY, JORNADA RANGE RESERVE;
FISCAL YEAR 1924

Pasture	Animal Days Feed	Average No. Of Stock	Estimated Forage Crop Winter: Spring	Summer: Fall	Total	Estimated Utilization	Carrying Capacity Based on 100% Util.	S.A. per Head; 100% Utilization	F.A. per Head; 100% Utilization	Class of Stock
1	324 512	886.6	--	70	70	100	887	84.0	6.0	Breeding Herd
2	151 904	415.0		60	60	100	415	81.3	6.9	" "
3	5 771	15.8		60	60	95	17	145.1	6.0	Dry Cows, Steers
5	17 631	48.2		65	65	105	46	61.4	5.1	All Classes, Mainly Horses
7	3 877	10.6		70	70	60	18	81.8	9.6	Poor Cows, Bulls
8	34 173	94.8		65	65	115	82	48.9	4.7	Steers.
9	4 811	13.1		75	75	75	17	44.8	9.9	Yearlings, Steers
10	26 831	73.3		40	40	105	70	68.8	5.9	Poor Cows
11	108 086	295.3		60	60	115	256	204.0	No Data	Horses
12	3 500	9.6		70	70	25	38	183.5	11.9	Yearlings.
13	34 513	94.3		65	65	60	157	108.0	12.2	Dry Cows
14	6 017	16.4		60	60	110	14	53.8	8.8	All Classes
Total	721 626	1973.0		65	65	100	2017	100.1		
Less Pasture 11	613 540	1678.0		65	65	95	1767	84.6	6.9	

Feeding Operations

Pasture No. 7,	3185	Animal Days	or	93	Feed Days--	34.2	Head Fed	1.4# per head per day	= 4339#
" " 8,	13972	" "	or	112	Feed Days--	124.7	" "	1.97# " " " "	= 13709#
" " 10,	1240	" "	or	64	Feed Days--	19.4	" "	1.20# " " " "	= 1505#

It is quite apparent that it will be necessary in the future to make an extensive reconnaissance of the Reservation during the growing season each year in order to eventually determine the forage acre requirements of the type of range over a period of years.

Pasture No. 1

As a whole this pasture carried, approximately, the correct number of cattle, but considerable over-grazing occurred in the vicinity of Headquarters, Puddle Tank and the Pipe Line, and a corresponding under-utilization around the vicinity of Red Bottom Tank due to improper distribution of stock, especially during the growing season, due to shortage of stock water in flood tanks at that time.

Pasture No. 2

This pasture would, undoubtedly, have been capable of carrying more cattle had the grama range in the vicinity of West Well been totally deferred during the growing season.

Over-grazing resulted in this locality because the range was not deferred.

All stock in this pasture should be confined to the east side of this pasture on Tobosa type at this time of the year.

Pasture No. 3

This pasture for the most part contains a very poor type of range and has been badly depleted due to drouth. Some over-grazing has occurred in the vicinity of Middle Well, due to feeding operations.

Pasture No. 5

It is difficult to prevent over-grazing this pasture because of its being used as a general utility pasture the year round; being mainly a grama type pasture, it would be more desirable to defer it during the growing season which is hardly possible under the circumstances.

Pasture No. 7

Having been used as a feeding pasture during the critical period, this pasture shows under-utilization, chiefly because a considerable portion of it is made up of Tobosa type range, which is best utilized during the growing season. This could only be accomplished at a sacrifice of the grama type range which covers approximately one third of the pasture.

Pasture No. 8

Although this pasture contains chiefly summer type range, it was over-utilized during the late winter and early spring because it was over-stocked with steers which were being held on feed.

Pasture No. 9

This pasture shows under-utilization because it was stocked during the winter and could have carried more cattle had it been stocked during the growing season, because of its being chiefly summer range.

Pasture No. 10

Due to drouth this pasture has sustained the heaviest loss in perennial grass density of any of the pastures on the Reservation.

It was used as a feeding pasture for a short period, during the critical spring period and because of there being only one watering place in the pasture, it shows over-utilization in the vicinity of the stock water.

Pasture No. 11

At the present time, this pasture is uncontrolled, because the cooperator has not maintained the fences. It has been used as a horse pasture and shows over-utilization because over-stocking by outside stray stock.

Pasture No. 12

This pasture was under-utilized because of lack of stock water, caused by Stewart Well being out of commission a good portion of the year. It contains the poorest range on the Reservation; it is entirely unsuited for cattle because of the rough character of the range and its great distance from stock water.

Pasture No. 13

This pasture was not stocked during the growing season, chiefly because of a shortage of cattle on the Reservation at that time. It was lightly stocked with dry cows during the late winter and spring which resulted in the low utilization; being chiefly, a summer pasture.

The over-utilization which occurred in the vicinity of Pasture No. 10 was due to the fact that a considerable portion of this pasture in this locality is grama type range on which the cattle, naturally grazed because of its being more palatable at that time of the year.

Pasture No. 14

On account of its size and location, this pasture has been used for a holding trap. It shows considerable overgrazing immediately adjacent to West Well, because of trampling caused by holding and working cattle at this point. This pasture will not be permitted in the future.

The table showing the number of stock carried during the Fiscal Years 1916 to 1924 inclusive shows the actual number carried in each pasture over this period.

A similar table is being compiled and will be available when the Carrying Capacity data has been refigured which will show the estimated Carrying Capacity of the several pastures based on 100 % utilization.

NUMBER OF STOCK CARRIED FOR FISCAL YEARS 1916-24. (Inclusive.)

FISCAL YEAR

Year	1916	1917	1918	1919	1920	1921	1922	1923	1924	9-year Average	
Pasture Number	AVERAGE NUMBER OF STOCK			AVERAGE NUMBER OF STOCK			AVERAGE NUMBER OF STOCK			No. Stock	Acres Per Head
1	1603.9	1550.0	875.4	1054.2	1167.7	1098.1	888.6	810.7	886.6	1103.9	66.6
2	1044.1	786.2	810.2	369.4	627.1	913.4	237.8	310.8	415.0	612.7	60.3
3	38.7	28.7	91.8	41.9	22.9	80.3	21.6	15.4	15.8	39.7	60.7
5	121.7	78.2	156.9	126.2	116.4	108.5	46.5	47.4	48.2	94.4	29.8
[illegible]	67.5	54.4	73.4	33.7	51.8	50.3	21.6	18.2	10.6	42.4	34.2
8	110.4	165.0	136.2	100.3	89.7	219.5	22.1	37.3	94.8	112.5	35.8
[illegible]	32.2	65.5	11.8	15.7	.3	43.3	11.3	21.9	13.1	23.9	32.8
10	148.3	111.1	238.1	143.4	115.5	157.7	51.1	49.7	73.3	120.9	39.8
11	608.1	533.3	871.9	266.2	256.6	324.8	362.2	337.4	295.3	428.4	122.3
12	255.8	189.9	21.3	18.2	---	83.2	14.2	57.5	9.6	72.2	97.6
13	401.0	263.6	258.2	148.6	304.8	265.1	186.2	75.1	94.3	221.8	76.6
14	Pasture enclosed in 1921					30.1	64.8	14.9	16.4	31.5*	24.4
Total	4431.7	3825.9	3545.2	2317.8	2753.8	3374.3	1928.0	1796.3	1973.0	2904.3	69.5
Less Pasture11	3823.6	3292.6	2673.3	2051.6	2496.2	3049.5	1565.8	1458.9	1677.7	2475.9	60.4

Note.--Pasture 2 contained 34,445 acres from 1916 to 1921 and 33,775 acres since then due to pasture 14 being enclosed.

*Pasture 14 average no. of stocks for 4 years only--therefore, average No of stock for the Jornada Range Reserve does not check on a 9-year basis. (Difference is 11.4 head.)

GS
Handling Stock Jornada
Increase in Calf Crop

PROJECT:

Increasing the average calf crop on South New Mexico ranges.

OBJECT:

To determine the factors which influence the production of calves in south central New Mexico so that improved methods of management may be worked out which will result in increasing calf crops.

STATUS:

This project was begun on the Jornada Range Reserve in 1913, so at the present time there are 12 consecutive years of data on which to base conclusions and compare with results on other ranges in this section of the state where cattle are generally carried on the Public Domain.

CALF CROP

Calendar Year 1924

Jornada Range Reserve.

Avg. No. Breeding Cows	Steer Calved	Heifer Calves	Total Calves Branded	Percent Increase	Avg. No. Bulls	Calves per Bull
1678	574	646	1220	72.7	71	17.2

The calf crop figure for 1924 is 5.2 better than that of the year previous.

The difference in the calf crops the past two years can be attributed, chiefly to the better climatic and forage conditions which prevailed during the breeding season of 1923, as compared to that of 1922. This made it possible for the breeding stock to get into condition earlier and stay in condition longer; with the result that more calves were produced under the relatively better breeding conditions.

The most reliable figures which can be obtained from other outfits in this locality show 5 cattle ranches, all with an estimated calf crop of 60% which is the best that has been obtained on these ranges since 1920. These outifts are all located within a radius of 25 miles of the Jornada and run their stock on the same type of range, where virtually the same climatic and growing conditions prevail.

An average of 9 counties in this section of the state for 1924 shows a calf crop of 45.5%.

There are a number of factors which account for this difference in calf crop in favor of the Jornada this year, the most pointed of which are: Generally speaking, other outfits in this locality maintain a much poorer grade of breeding stock; not having adequate pasture facilities, the control of the stock is poor; the cattle are not maintained in sufficiently good condition to breed well, due chiefly to lack of adequate forage and poorly watered range; the number and distribution of bulls and the class of bulls is such that the breeding herd does not receive good bull service.

The results, however, that materially affect any business are not what is accomplished in any one year through force of circumstances, but that which can be accomplished over a period of years, through improved methods of management.

The following table shows the calf crop figures for the Jornada for the past 12 years compared with the best available data of this kind for Southern New Mexico.

C A L F C R O P

1913 - 1924

JORNADA RANGE RESERVE AND SOUTHERN NEW MEXICO.

Year	Jornada % Calf Crop	Southern N.M. per cent Calf Crop	Cumulative Average 1916-1924 Cows	Total	Calves	Total	% Calf Crop	Southern N.M. Calf Crop
1913	48.0	50.0	2750		1320		48.0	50.0
1914	62.0	55.0	1417	4167	878	2198	52.8	52.5
1915	52.0	40.0	1743	5910	907	3105	52.5	46.2
1916	72.1	60.0	2022	7932	1459	4564	57.5	53.1
1917	64.1	32.5	1986	9918	1273	5837	58.8	42.8
1918	58.8	30.0	1809	11727	1064	6901	58.8	36.4
1919	43.7	35.0	2156	13883	942	7843	56.5	35.7
1920	83.2	70.0	1615	15498	1343	9186	59.3	52.8
1921	67.3	55.0	1146	16644	771	9957	59.8	58.9
1922	64.3	50.0	1008	17652	648	10605	60.1	54.4
1923	67.5	30.0	727	18379	491	11096	60.4	42.2
1924	72.7	45.5	1678	20057	1220	12316	61.4	43.8

There are a number of rather interesting points brought out by this table.

Curves showing the yearly calf crops on the Jornada compared with those of Southern New Mexico show, with only two exceptions, similar fluctuations in good and lean years effecting the calf crops for both the Jornada and Southern New Mexico in practically the same manner. The Jornada curve begins at 48.0% and after fluctuating from year to year ends up at 72.7% while the Southern New Mexico curve begins at 50.0% and after 12 years ends up at 45.5%. The most outstanding feature of this table is, however, the trend of the accumulative average calf crop over the 12-year period for the Jornada and Southern New Mexico.

The Southern New Mexico curve shows similar fluctuations to the corresponding curve for the yearly calf crops, but the Jornada curve shows with only two exceptions, 1915 and 1919, a gradual increase and improvement toward a higher calf crop percentage. The Southern New Mexico curve shows a beginning at 50.0% and after fluctuating up and down over the 12-year period, similar to the corresponding yearly curve, it ends in 1924 at 43.8%, showing that the calf crops in this part of the state have decreased gradually during this period. The Jornada curve, however, shows a beginning at 48.0% and after an almost continual trend upward ends at 61.4%. This figure for the Jornada since 1915 when it was taken over by the Forest Service amounts to 64.9%. These two final figures 43.8% for Southern New Mexico and 61.4% for the Jornada are also the true average calf crop figures for the Jornada and Southern New Mexico over the 12-year period as nearly as can be determined by the data available. The difference amounts to 17.6% which represents the results which have been obtained on the Jornada through adopting better methods of management and consistently adhering to certain principles which have been found to be essential in the successful handling of both range and cattle in this section of the Southwest.

Briefly, these principles are:

1. Maintenance of the breeding herd in good condition throughout the year by means of adequate range forage, well-watered range, proper salting and the early weaning of calves.

2. Improving the breeding herd by culling undesirables, replaced by better and younger individuals.

3. The use of a sufficient number of pure-bred vigorous bulls changed at least every four years and well-distributed over the range. Good bulls should, in order to produce good calves, be maintained in vigorous condition the year round, even if feeding is necessary.

4. Eliminating in so far as possible the breeding of yearling heifers.

5. Maintaining a breeding season and segregation of the breeding stock.

FURTHER WORK:

This project will be carried on in the future along the same lines as in the past, subject to improvement.

USE OF DATA:

For practical application to similar ranges in the Southwest.

DATE OF COMPLETION:

Continuous.

G. S.
Handling Stock, Jornada
Improvements in Grade

PROJECT:

Improving the average grade of stock on Southern New Mexico ranges.

OBJECT:

To improve the general grade of range stock through improved methods of breeding so that the cattle produced will approach more nearly to the color, conformation and type of the beef breeds used, with the ultimate object in view of obtaining better prices for a product which is more uniform and supplies a better demand.

STATUS:

Since 1915, only pure-bred bulls have been used on the Jornada, and this together with a more or less systematic culling of undesirable cows replaced by heifers of good color, conformation and Hereford characteristics, in general, has resulted in building up the T-Hook herd on the Reservation to a point where it now stands as one of the best bred range herds in this part of the Southwest.

It has been found by experience on the Jornada that one of the biggest factors in maintaining and breeding up the size of the individuals in the breeding herd is the entire elimination of yearling heifers for breeding purposes. This class of stock should not be allowed to breed until at least 20 months of age. If allowed to breed as a yearling heifer, particularly during drouth periods, such practice will result in stunting both the calf and the heifer, because the calf does not receive the nourishment it should and the heifer's growth is materially affected by having to bring up the calf. Heifers which calf at 30 months are more mature, make better mothers, bring up better calves, and grow into better cows themselves

The most up-to-date cowmen are now advocating culling the breeding herd 10% each year, which is advantageous in that it tends toward a comparatively young breeding herd, enables the sale of cull cows which bring a better price and results in a breeding herd in which the individuals are better able to maintain themselves in good condition and produce better calves.

A herd of this character, the culls of which are replaced with selected unbred heifers of approximately two years of age is bound to improve the grade, and if maintained in good condition and provided with the right kind of bull service, is capable of producing offspring which have quality, good conformation and size; and demand a good market price.

From experience on the Jornada, and other ranges on the locality, it has been found that, although size, type, color and conformation are essential qualities in a bull, he cannot be expected to produce a fair number of good calves, if not maintained in good condition the year round. Even on exceptional years with plenty of range and forage, bulls should be fed a maintenance ration of cottonseed cake or some other concentrate, in order to keep them in flesh and good condition. Where a breeding season is maintained and bulls are confined to a separate pasture during the winter and spring, the feeding of concentrates during this period can be handled with little difficulty.

For use on Mesa range in this section of the southwest, a heavy type bull can be used successfully, providing watering places are sufficiently numerous, but for general use, the medium heavy type is, perhaps, more preferable. Although, adhering to a breeding season may not effect the breeding up of a herd materially, all other things being equal. The chief benefit from such a practice is the production of an even-aged calf crop coming at one period of the year. This, not only cuts down branding and other expenses in this connection, but enables the sale of ~~conform colors~~ uniform calves or steers which enjoy a much healthier market.

The real value in building up the Jornada herd to such a high standard, is the relatively higher prices which the stock bring each year when disposed of, as compared with other shipments of cattle in this section of the country. It has been an exception in the past, when yearling steers and calves have not brought from $2.50 to $5.00 per head more than the same class of stock from neighboring ranges.

During the past two years small lots of calves, yearling steers and yearling heifers, have topped in both weight and price, by a high margin any range stock which has been sold in this section of the country.

The top carload of steer calves last year weighed out 465 pounds and at 6 cents a pound brought $26.49 per head with a 5% shrink in lieu of delivery.

Through force of circumstances last year, the cooperator was forced to sell the two-year old steers from the Jornada at 4½ cents per pound which was ½ cent less than other cattle of the same class brought from adjoining ranges, but he was offered 6 cents a pound for these steers and could not sell for that figure because he was unable to deliver.

This year one lot of 52 heifer calves which sold for feeding purposes averaged 377# and at 6 cents a pound brought $22.12 and another similar lot of steer calves weighed out 386# and at 6 cents a pound brought $22.68 per head. These prices compare very favorably with the best price obtained in this locality which was $21.50 per head for a small lot of 40 steer calves sold for feeding for baby beef.

The general run of steer calves this fall in this locality sold at an average price of $13.00 to $14.00 per head--295 steer calves from the Jornada herds sold for $15.00 per head along with 300 more from the cooperator's outside calves. Had these calves sold alone, they would have sold for at least $18.00 per head, since they averaged very close to 400#. The entire lot of 600 calves averaged 340#. The steer prices obtained from yearlings, twos and threes coming from the Jornada herds this fall were also considerably above the prices secured for the same classes of cattle from the surroundting territory.

The Jornada steers brought $20.00, $25.00 and $30.00, respectively, for yearling twos and threes, while the same classes from adjoining ranches only averaged $20.00 per head for horned and $21.00 per head for dehorned cattle in practically the same ratio. For the most part, prices for stock cattle of all kinds in this section of the state the past fall have been almost ruinous, because of the heavy forced selling which has been taking place for the past year. The condition of the cattle the past fall has also, been responsible in measure for the relatively low prices, because a big majority of the cattle are somewhat drouth-stricken and buyers anticipating this, invariably offer lower prices under these circumstances even though the cattle may in some instances be worth more.

With but few exceptions, practically all of the sales made in this locality this year have been by the head, while last year the majority of the sales were made by the pound.

FURTHER WORK:

This project will be carried on in the future along the same lines as in the past, subject to improvement.

USE OF DATA:

For practical application in this section of the Southwest and for comparative purposes over a period of years to determine its economic importance.

DATE OF COMPLETION:

Continuous.

GS
Handling Stock, Jornada
Management to avoid Loss

PROJECT:

Range management to avoid loss of cattle due to starvation, diseases, etc.

OBJECT:

To determine the best means of preventing losses caused by starvation, diseases and other causes which materially affect the cattle business in the Southwest, so that such limiting factors may be eliminated from the industry insofar as is possible.

STATUS:

Records on this project for the Jornada and South Central New Mexico have been kept since 1915 which makes available 10 years of data on this phase of the work.

The following tables show the losses in detail which have occurred on the Reservation the past year and since 1915, and total losses for this section of the state for the same period.

Table No. 1

LOSSES OF STOCK BY CLASSES . 1924

Month	Cows	Bulls	Yr. Steers	Yr. Heifers	Steers	Calves	Total
Jan.	1	-	—	1	1	—	3
Feb.	1	2	—	-	-	--	3
Mar.	4	-	—	—	--	--	4
Apr.	7	-	—	—	1	—	8
May	2	-	—	—	--	--	2
June	5	-	1	—	--	2	8
July	2	1	--	--	--	--	3
Aug.	1	-	--	--	--	--	1
Sept.	-	1	—	--	--	--	1
Oct.	2	-	--	--	--	--	2
Nov.	NO LOSSES						
Dec.	NO LOSSES						
Total	29	4	1	1	2	2	39
Percentage	.89	.13	.03	.03	.06	.06	1.2

Table No. 2

LOSSES BY CAUSES AND CLASSES, CALENDAR YEAR 1924

Cause	Cows	Bulls	Year Steers	Year Heifers	Steers	Calves	Total
Blackleg	--	--	--	1	--	--	1
Bogged	1	--	--	--	--	1	2
Calving	1	--	--	--	--	--	1
Cancer Eye	2	--	--	--	--	--	2
Exhaustion	--	--	--	--	1	--	1
Injury	3	1	--	--	1	--	5
Poison Plant	1	--	--	--	--	--	1
Poverty	18	3	1	--	--	1	23
Snakebite	1	--	--	--	--	--	1
Unknown	2	--	--	--	--	--	2
Total	25	4	1	1	2	2	39

Table No. 3

LOSSES IN PERCENT BY CAUSES

Cause:	Black-leg	Bogged	Calving	Cancer Eye	Exhaustion	Injury	Poison Plants	Poverty	Snake-bite	Unknown	All Causes
	1	2	1	2	1	5	1	23	1	2	39
% of Tot. Loss	.03	.06	.03	.06	.03	.05	.03	.72	.03	.06	1.2

General Remarks

Only one yearling heifer was lost from blackleg; it is quite certain that this loss was due to the animal being missed in the vaccinating operation. Since the use of the germ-free vaccine was begun in 1918, losses from Blackleg have occurred but rarely.

Two cows died from cancer eye; several cases of this disease have developed on the Reserve the past year. Since it is somewhat common in the cooperator's outside cattle, it is assumed that these infections have originated from this source.

Losses from injury amounted to three cows, 1 bull and 1 steer. One cow got hung up in a soapweed and succumbed. The balance had their legs or hips broken at watering-places.

The greatest losses occurred from poverty; 14 cows, 3 bulls, one-year steer and 1 calf. Considering that the past spring was very dry and the forage crop of the preceding year very short, this loss is not alarmingly high.

The low loss of one cow from calving the past year can be accounted for, in part, by the fact that very few yearling heifers were bred the year previous.

The heaviest loss from calving, invariably, occurs with this class of stock.

The loss of one cow caused by poisonous plants is attributed to loco poisoning.

Losses from snake bite occur very rarely.

Table No. 4

CUMULATIVE LOSS RECORD--JORNADA RANGE RESERVE

AND SOUTHERN NEW MEXICO, 1915-1924.

Year:	Losses by Causes.											Total: Loss: es	Loss: % J.R.R.	Loss: % Sou. N.M.:	Cumulative J.R.R.	Cumulative Southern New Mexico
	Pov-erty:	Black leg	Injury: Bogged or Drowned:		Cancer eye	Predatory: Animals	Poison: Plants:	Calv-ing	Light-ning	Misc. Dis.:	Un-known:					
1915:	?	14	3	-	-	-	-	3	2	23	45	1.6:	7.3:	1.6	7.3
1916:	13	22	Record Incomplete								66	1.5:	7.3:	1.6	7.3
1917	23	19	4				5	8		12	20	91	1.8:	12.5:	1.7	9.9
1918:	43	12	2	1	-	1	-	4	2	4	9	147	3.5:	25.0:	2.6	17.4
1919:	37	4	Record Incomplete								56	1.5:	5.0:	2.5	11.2	
1920:	3	1	-	-	-	-	-	1	4	-	7	16	0.5:	5.0:	1.5	8.1
1921:	15	3	2	-	-	-	-	1	-	-	6	27	1.1:	15.0:	1.3	11.5
1922:	77	1	3	-	-	1	-	7	1	-	3	93	4.4:	12.0:	2.8	11.7
1923:	8	3	1	-	-	-	-	4	-	-	3	19	1.2:	5.0:	2.0	8.3
1924:	23	1	6	2	2		1	1		1#	2	39	1.2:	6.2:	1.6	7.2

Snake bite.

CUMULATIVE LOSS RECORD--1915-1924

This record is similar to that of calf crops in that the yearly fluctuations point out the drouth and good years both for the Jornada and outside range in this section of the state by the contrast in loss figures for those years, due chiefly to starvation.

The highest yearly loss sustained on the Jornada over this period was in 1922 when the loss amounted to 4.4. Over 71.6% of this loss was due to starvation. This is the worst drouth year ever experienced on the Jornada. Losses for outside range in this section of the state amounted to 12.0 for that year due chiefly to starvation.

The lowest loss sustained on the Jornada since 1915 was .5% in 1920; only 19% of the losses this year were attributed to starvation. On outside range in this section of the state the losses amounted to 5%, reported to be primarily due to Blackleg. On the Jornada only 6% of the losses that were due to this cause.

The accumulative average curve for Southern New Mexico representing losses since 1915 shows a fluctuation of 10.2% over this period, while the same curve for the Jornada shows a fluctuation of only 1.1%.

Over this period of 10 years, losses for outside range in this section of the state show an accumulative average of 7.2% while the same average for the Jornada amounts to but 1.6% which is 22.2% or approximately, 1/5 of the loss which has been sustained on outside ranges in this section of the state over this period of years.

An analysis of loss figures over this period of years in this part of New Mexico shows that by far the greatest number of losses are caused by starvation, blackleg and poisonous plants, chiefly, loco. Losses from other causes are of lesser importance.

On the Jornada, the relative low loss from starvation that has been sustained since 1915, is the result of consistent efforts during this time to provide sufficient forage for the stock at all times during the year by properly stocking the range, maintaining a 15 to 20% surplus of forage on the ground in good years, and feeding small amounts of cottonseed cake and other concentrate to weak individuals. The consistent culling of old cows and bulls is one of the best means of preventing losses of this kind.

The breeding of yearling heifers has also been found to be the cause of this particular class of stock becoming poverty-stricken, thus requiring the necessity of feeding in order to prevent loss; this is especially true when they calve during extremely critical spring periods.

The early weaning of calves also has a considerable bearing upon losses from starvation and whether or not, it may be necessary to feed to prevent loss. Feeding should be considered more or less as a necessary evil to be avoided to a large extent, if possible, by under-stocking rather than over-stocking a range.

Some cow-men complain of not having pasture facilities to enable them to conserve a surplus of forage during good years in order to prevent feeding. Even though it may not be possible through lack of pasture facilities to practice deferred grazing, the same result is possible of accomplishment by conservative yearlong stocking.

Since 1917, losses on the Jornada from Blackleg have been reduced to almost nil through the consisten use of germ free vaccine, administered to calves at branding and weaning time, one does of which renders the animal immune.

Losses from poisonous plants such as loco weed have been reduced to a certain extent by grubbing out areas infested with this weed, but the biggest factor in preventing losses from poisonous plants on the Jornada has been to provide a sufficient amount of palatable range forage on the ground by preventing over-stcoking so that the stock will not consume the less palatable loco weed and other poisonous plants because of a shortage of good range forage.

The losses for 1924 on the Jornada amounted to 1.2%, the same figure which was recorded for 1923. The heaviest loss was due to starvation owing to the fact that the financial condition of the cooperator would not permit him to feed a sufficient amount of concentrate to weak individuals during the critical spring and early summer. Failure to cull a sufficient number of old cows and bulls the year previous would have eliminated this loss almost entirely.

FURTHER WORK:

This project will be continued in the future along the same lines as in the past, subject to improvements.

USE OF DATA:

For practical application to similar ranges in the South-west.

DATE OF COMPLETION:

Continuous.

GS
Handling Stock, Jornada
Management to avoid loss
Feeding Calendar Year 1924

Feeding Operation.

The feeding of cottonseed cake to poor stock on the Jornada started February 18, and with the exception of 10 days in May, when feeding was discontinued because of the inability of the co-operator to obtain cottonseed cake, it continued to June 14, a total of 107 feeding days in all.

During March most of the stock feed was outside stuff. The major feeding of the bulls was done in May and June, which, however, was too late to be of any great value.

The amounts fed and the other details of the feeding operations are recorded in the following tables;

FEEDING RECORD 1924

JORNADA RANGE RESERVE.

The following data show in detail, the feeding records for the several pastures in which the feeding operations were carried on.

Cottonseed Cake Feeding at South Well
Pasture No. 7

Month	No. Animal Days	Animal Days	Ave. No. per day	No. lbs. C.C. fed	Pounds of Cottonseed Cake per day	per head	per head per day
Feb.	18	203	11.3	390	21.7	34.5	1.9
Mar.	31	983	31.7	1950	62.9	61.2	1.9
Apr.	30	1165	38.8	1165	38.8	30.0	1.0
May	14	834	59.6	834	59.6	14.0	1.0
Totals & Avgs	93	3185	34.2	4339	46.6	126.9	1.4

Cottonseed cake fed - - - - - - - - - - - 4399.0 Pounds
Cottonseed cake consumed by each animal---126.9 "
Cottonseed cake fed per head per day - - - 1.4 "

Classes of stock fed by months.

February--Eight extra poor cows and five bulls.
March --Mostly poor cows and 3-4 bulls,(all outside stuff).
April --Poor cows and about eight bulls.
May --Poor cows and about five bulls.

The stock fed in this pasture, actually showed a gain in flesh the first two months,due to the heavier ration of cottonseed cake and because of the pasture being fresh with about 500 acres of grama grass available during April and May. After that time, the grama grass being entirely consumed, the cattle had to rely on Tobosa and burro grass, chiefly for ruffage which being poor winter and spring forage,caused them to fall off.

The reduction of the Cottonseed cake ration almost 50%, however, was the chief reason for the cattle doing so poorly. As a matter of fact, the cottonseed cake ration should have been reversed as to time of feeding with the heavier ration of 1.9 # per head given during the latter two months and 1.0 pound per head given the first two months when the cattle were using the best grass in the pasture.

Cottonseed Cake Feeding at South Well

Pasture No. 8

Month	No. Days	Animal Days	Ave. No. per day	POUNDS OF COTTONSEED CAKE Fed	per day	per head	per head per day
Feb.	22	4668	212.2	4396	200.0	20.7	0.94
March	31	5792	186.8	5463	175.4	29.1	0.94
April	30	2899	96.6	2899	96.6	30.0	1.0
May	20	444	22.2	444	22.2	20.0	1.0
June	9	169	18.8	507	56.3	27.0	3.0
Total & Avg.	112	13972	124.7	13709	122.4	109.9	0.97

Cottonseed cake fed - - - - - - - - - - - 13709.0 Pounds
Cottonseed cake consumed by each animal - -109.9 Pounds
Cottonseed cake fed per head per day - - - 0.97 "

Classes of stock fed by months.

February--Mostly steers and a few poor cows and bulls.
(Steers, outside stuff.)
March --Mostly yearling steers and 40 yearling heifers.
(Steers, outside stuff.)
April --Mostly steers and a few cows and bulls.
(Steers, outside stuff.)
May --Practically, all bulls.
June --All bulls.

The steers fed in this pasture during February and March were cut-backs from a herd of over 1000 head of steers sold during January; about 3/4 of these steers were from the cooperators outside range.

The cooperator was offered 4½ cents per pound for these cut-backs about the time these were put on feed and was urged to sell them because of shortage in range and the expense of feeding, but, because they would not average over 400 pounds or $19.00 per head, he refused; preferring to hold them on feed with the hope of selling them in April at a considerably higher figure.

Being drouth-stricken cattle, these steers classed hardly better than a poor grade of yearlings and due to the low palatability of the grass in this pasture, together with the small ration of cottonseed cake fed, and also because hardly half of these steers took to feed, these cattle, instead of being maintained, showed a considerable loss at the end of the two and one-half months' feeding period.

Due to the shortage of grass in this pasture, these cattle had to be moved to outside range during the critical period, which resulted in a considerable loss. These steers were finally sold in October for $20.00 per head. Had these steers been sold in January for $19.00 per head, the cooperator would have been relieved of the expense of feeding, pasturing and moving these cattle; which, together with the death loss sustained, amounted to fully $3.00 per head, or a net loss of, approximately, $2.00 per head below the original offer.

This demonstrates very clearly the inadvisability of holding this class of cattle on a short feed of concentrate during a period of grass shortage and on a type of range which is best suited for summer use.

Cottonseed Cake Feeding at South Well

Pasture No. 10

Month	No. Days	Animal Days	Ave. No. Stock	POUNDS OF COTTONSEED CAKE Fed	Per day	Per Head	Per Head per day
March	17	215	12.6	438	25.8	34.7	2.0
April	30	678	22.6	678	22.6	30.0	1.0
May	3	333	111.0	333	111.0	3.0	1.0
June	14	14	1.0	56	4.0	56.0	4.0
Totals & Avg.	64	1240	19.4	1505	23.5	77.6	1.2

Cottonseed cake fed - - - - - - - - - - 1505.0 Pounds
Cottonseed cake consumed by each animal -77.6 Pounds
Cottonseed cake fed per head per day - - 1.2 Pounds

Classes of Stock fed by months.

March--Poor Cows
April--Poor Cows
May--Cows and about six bulls.
June-One bull for 14 days, 4 # per day.

The weakest and poorest cattle on feed at this time were placed in this pasture. Since this pasture is made up of a type of range which runs to a high percentage of grama grass, the stock fed in this pasture showed a decided gain in flesh, notwithstanding the fact that the time of duration of feeding in this pasture was limited and the ration of cottonseed cake fed was very little more than that fed to the stock in pasture No. 8 and less than that fed in pasture No. 7.

SUMMARY, FEEDING OPERATIONS 1924

JORNADA RANGE RESERVE

Reduced to a basis of 107 actual feeding days.

Pasture	Animal Days	Animal Days Feed	Av. No. Stock	Pounds of Cottonseed Cake Fed	Per Day	Per Head	per head per day
7	93	3185	34.2	4339	46.6	126.9	1.4
8	112	13972	124.7	13709	122.4	109.9	0.97
10	64	1240	19.4	1505	23.5	77.6	1.2
	107	18397	171.9	19553	182.7	117.7	1.06

No feeding during ten days in May.

GS
Handling Stock, Jornada
Salting, Calendar year 1924

The following tabulated data show the amount and distribution of salt put out on the Jornada Range Reserve during the calendar year 1924.

Table No. 1

Amount of Salt put out in the various Pastures during 1924. (Lbs.)

Pasture	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1	1300	500	2000	1150	--	850	1750	1150	2000	1000	500	--	12200
2	800	900	750	200	--	450	400	--	600	500	500	--	5100
3	--	--	150	--	--	--	--	--	--	--	--	--	150
5	150	--	--	100	--	100	[illegible]	--	150	--	--	--	500
7	--	--	200	--	--	--	--	--	--	--	150	--	350
8	--	--	400	--	--	250	--	--	--	--	--	--	650
9	--	--	--	--	--	100	--	--	--	--	--	--	100
10	--	--	150	--	--	300	--	--	--	--	--	--	450
11	50	--	--	150	--	--	--	--	--	--	--	--	200
12	--	--	--	--	--	100	--	--	--	--	--	--	100
13	500	--	300	300	--	200	400	700	900	500	--	--	3800
14	--	--	--	--	--	--	--	---	--	--	--	--	---
Total	2800	1400	3950	1900	---	2350	2550	1850	3650	2000	1150	--	23600

All salt was put out in the standard 50-pound blocks, material of the same grade as table salt. This form and quality of salt has proven to be very satisfactory and for the conditions prevailing in this locality, it would be hard to improve upon.

Table No. 2

Pasture:	Lbs. of Salt	Ave. No. Stock	Lbs. per head
1	12200	962.3	12.7
2	5100	424.2	12.0
3	150	15.9	9.4
5	500	66.0	7.5
7	350	20.7	17.0
8	650	112.6	5.8
9	100	17.2	5.8
10	450	93.1	4.8
11	200	295.1	0.7
12	100	25.5	4.0
13	3800	300.4	12.6
14	---	17.8	---
Total	23600	2350.8	10.0

SUMMARY OF SALTING, 1924

Ave. number of pounds of salt put out per month	1966.6
Ave. number of pounds consumed per head during year	10.0
Average number of pounds put out per head per month	0.84
Ave. number of pounds consumed per head of stock on the mesa.	11.3
Average number of pounds consumed per head of stock in the three largest pasture Nos. 1, 2, 13	12.5

Due to the fact that a considerable amount of salt was put out last year which was not utilized at the end of the year, several of the pastures show considerable less salt put out than was actually available for the stock in these pastures.

Pastures 3, 9 and 12 carried very few cattle the past year and salting was neglected in these pastures. Pasture No. 11 which carried only horses, was not salted sufficiently , due to the financial condition of the co-operator.

With the exception of Pasture No. 7, all of the pastures received somewhat less salt than should have been put out.

At least 18# per head should have been available. Under ordinary conditions, this amount has proven to be sufficient for the needs of cattle on this type of range.

In the future, an effort will be made to salt away from water on grama grass range during the winter and early spring. This recommendation will be incorporated in the new management plan. It is believed that salting away from water on this type of range at this time of the year will not only result in better utilization and less congestion and trampling around watering places, but will enable the cattle to obtain salt while out from water, since ordinarily, cattle do not water oftener than every two days at this time of the year.

GS
Water Development
Jornada

PROJECT:

Number, distribution and cost of watering places on cattle ranges of the Southwest.

OBJECT:

To determine effective methods of water development and effective distribution of watering-places to secure maximum utilization of the range consistent with the difficulty and cost of water development.

STATUS:

During the past nine years, studies have been made on the Jornada for the purpose of determining the maximum distance which cattle can travel on Mesa type range and secure proper utilization of the range. Observation and data show that this distance should not exceed 2½ to 3 miles.

Further observations have shown that a limited number of small flood tanks can well be used on summer Tobosa types in order to best utilize this type of range during the season of the year when it is most palatable. These tanks can also be used to relieve permanent watering-places and the surrounding range at this time of the year in order to conserve both range and water for winter and spring use.

Studies have also been made to determine a suitable type of storage tank for use in connection with deep wells operated by windmills and at springs for the purpose of conserving a supply of stock water.

Bottomless steel tanks of 20 to 50,000 gals. capacity have proven to be well-adapted for use under such conditions and provide very satisfactory and permanent means for storing stock water. This type of tank costs between $600. and $1000 per tank and, although, somewhat expensive as to first cost, tanks of this kind require very little upkeep over a long period of years.

Where large storage tanks are used to store water from deep wells, the necessity for using gasoline engines in conjunction with windmills in case of emergency, can be done away with to a great extent, on account of the large supply of water on hand at all times; which is sufficient to care for the need of stock over reasonably long periods of still weather, or when windmills and pumps may require repair and over-hauling.

The importance of sufficient permanent watering-places, well-equipped for storing a large supply of cheap stock water, can hardly be over-estimated in this section of the country, especially where the source of supply comes, chiefly from deep wells.

The three types of water development now used on the Jornada, are deep wells operated by windmills and equipped with storage tanks. Flood tanks, yearlong and temporary, and a pipe line fed by springs in the mountains which supplies watering troughs distributed at intervals of two miles along the pipe lines.

No progress has been made during the past year in collecting new data on this project.

FURTHER WORK:

After final arrangements have been made with the new cooperator, the construction of at least 6 new storage tanks, the improvement of the pipe line and developing of several of the springs in the mountains, in all probability, will be gotten under way.

Opportunity will be taken during the construction of these improvements to obtain up-to-date data on costs, method of construction and numerous other features in connection with this work.

Data on stock water development and improvement will also be obtained from neighboring outfits in this section of the country which will also be included in the succeeding report.

DATE OF COMPLETION:

Continuous

GS
Handling Stock, Jornada
Operating and Production Costs.

PROJECT:

Cost of cattle production and operation on the Jornada Range Reserve.

OBJECT:

To determine the cost of the various items connected with the operation of the Jornada Range Reserve for the purpose of eventually determining the cost of running a cow and producing a calf under similar conditions in this section of the Southwest.

STATUS:

Owing to the difficulty experienced in the past in obtaining correct cost data from the cooperator because of the complicated nature of his expenditures which involved his outside holding as well as those on the Jornada, it has not been possible to work up the project from year to year without spending an unreasonable amount of time in working up the data.

This year, however, an effort has been made to determine and arrive at a fair estimate as to just what the different operating items amount to, based on both experience and data in the past with values as nearly as they can be determined at the present time.

The several items which go to make up the cost of carrying a cow have been classified and figured as follows:

Jornada Range Reserve

Operating Charges.

Items		Total	Per Cow
Pasture. 1500 cows at $1.50		$2250.00	$1.50
Water Service			
Windmill man, $75 per mo.	$900.00		
Ford car, 10 miles a day at 5c. a mile, per year.	182.50		
Gasoline and oil for pumping	135.00		
Repair parts	100.00		
Board	182.00		
Total		1500.00	1.00
Salt			
20 lbs. per head of C.& H.			
32700 lbs. at $1.05 per 100 lbs.		343.35	0.222
Labor.			
Foreman--salary	720.00		
1 cowboy "	480.00		
1 fence-rider--salary	480.00		
1 handy man	360.00		
Total Yearlong	2040.00		
Wagon work--4 weeks			
8 Cowboys	320.00		
1 cook	50.00		
1 horse wrangler	40.00		
Total	410.00		
Total labor, $2040 and $410.00--		2410.00	1.63
Provision of Employees yearlong			
At 50 cents per day		1277.50	
Depreciation on Equipment			
$25000.00 at 4%		1000.00	0.66
Horses and Mules (60 head at $30--			
	$1800.00		

Jornada Range Reserve

Operating Charges (continued)

Items		Total	Per Cow
Horses & Mules (CONT.) (60 head at $30-- $1800.)			
Depreciation at 4%	72.00		
Feed at $6 per head, 1 month--60 animals	360.00		
Loss--2%	36.00		
Pasturage, 60 head at $1.50	90.00		
Total		558.00	0.37
Bulls (75 at $75 per head	5625.00)		
Depreciation at 12½%	703.13		
Feed, 15 tons at 35c	525.00		
Loss 2%	112.50		
Pasturage at $1.50	112.50		
Total		1453.13	0.97
Cows (1500 at $22.50-- $33750.00			
Depreciation at 4%	1350.00		
Feeding 100 for 100 days, 21 lbs. cake per day 20000 lbs. at $35 per ton	350.00		
Labor 100 days at $1.50	150.00		
Board " " " 50c	50.00		
Loss 2%	675.00		
Total cows less pasturage		2575.00	1.71

SUMMARY

	Total	Per Cow
Pasture	2250.00	1.50
Water Service	1500.00	1.00
Salt	343.35	0.22
Labor	2410.00	1.63
Provisions	1277.50	0.85
Depreciation on Equipment at 4%	1000.00	0.66
Horses and Mules	558.00	0.37
Bulls	1453.13	0.97
Taxes on Investment	1504.90	1.00
Cows less pasture	2575.00	1.71
Total Cost of carrying a cow	$14871.88	$9.91 ✓

Cost of a 9 months calf or short yearling.

			Total Cost	Cost per Calf
Calf crop	84%			
Loss	2%			
Calves	62%	of 1500 cows or 930 calves cost	$14871.88	$15.99 ✓

JORNADA RANGE RESERVE

Cost of Operation.

Valuation for tax assessment purposes.

Ranch and Improvements.	
Patented land 320 acres at $1.00	320.00
Windmills, wells & pump equipment	
6-20 foot mills at $1000.00	6000.00
Corrals, 1 at $100.00 and 2 at 50.00	200.00
Dipping vat	100.00
Stock scales	100.00
Tools, vehicles, harness, etc.	200.00
1 house--$600, 2 houses at $300-$600	
2 houses at $50-$100, 3 at $20-$60	1360.00
Total Ranch and Improvements.	$8280.00

JORNADA RANGE RESERVE

Cost of Operation

Cows 1500 at $19.00	28500.00	
Bulls 75 at $38.00	2850.00	
Horses 50 at $30.00	1500.00	
Mules 10 at $10.00	100.00	
Total Live Stock		$32950.00
Total Ranch and Live Stock		$41230.00
Tax Rate, State & County		
$41,230.00 at $3.65 per $100.00	1504.90	
Taxes per cow		
1500 cows--taxes per cow ($1504.90 ÷ 1500)		$1.0032

Above valuations taken from the Dona Ana County assessors Books 1923 tax roll.

Valuation of Ranch & Improvements Actual:		
Sale price of Ranch by El Paso Cattle Loan Co.	$15000.00	
Necessary Improvements	10000.00	
Total		$25000.00
Valuation of Live Stock Actual		
Breeding cows 1500 at $22.50	33750.00	
Bulls 75 at $75.00	5625.00	
Horses and Mules 60 at 30.00	1800.00	
Total Live Stock		$41175.00
Total Ranch and Live Stock		$66175.00
Interest at 8%		5294.00
Interest per Cow		

NORNADA RANGE RESERVE

Cost of Operation.(Continued.)

Interest per Cow

1500 cows--per cow ($5294.00:1500)		3.52
Interest on Investment	Total	Per Calf
8% on $66,175.00 charged against 62% or 930 calves	5294.00	5.69

Total cost of raising a calf ($14,871.88 total running) including interest $20,165.88(Expense. $5,294.00 Int. on investment.) 21.68

Figuring on this basis it would require a 67.2 calf crop to pay interest and running expenses with calves selling at $20.00 per head or an 89.6% calf crop with calves selling at $15.00 per head.

Actual running expenses in order to break even, could be paid with a 49.5% calf crop and calves selling at $20.00 or the same could be accomplished with 66.0% calf crop and calves selling at $15.00 per head. This year with a 72.7 calf crop it would have been necessary to sell calves at $18.50 per head in order to pay interest and running expenses, or if sold at $13.644 per head they would have paid running expenses.

The total receipts from calves this year on the Reservation amounted to:

Steer calves--300	at	$15.00 per head	$4500.00
Selected 60 heifer calves and 40 steer calves--100	At	22.50 per head	2250.00
Balance of calves 820	at	7.50 per head	6180.00
Total			12900.00

The average sale price per calf amounted to $10.57.

If it had not been due to the fact that the sale was consumated through forced liquidation, it is reasonable to assume that total sales of all classes of stock under normal conditions ownership and sale would have more than paid expenses, on the above basis, since during February 1925, the same calves that sold for 15.00 would have brought $20.00 and those that sold for $7.50 would have brought $10.00 to $12.50.

FURTHER WORK:

Carried as a permanent project.

USE OF DATA:

To aid in determining the economic phases of the cattle business on the Jornada, for purposes of comparison and for application to similar outfits in this section of the Southwest.

DATE OF COMPLETION:

Continuous.

GS
Handling Stock, Jornada
Range feeding in cooperation
with the A.H. Dept. of the
New Mexico College of Agriculture

PROJECT:

Supplementary range feeding of concentrates to cattle.

OBJECT:

To determine the amount of concentrate (cottonseed cake) necessary to feed, in order that such feeding may be of real value to the cattle and at the same time be economic.

STATUS:

This project was started in Pasture No. 7 of the Jornada Range Reserve on October 22 through a cooperative agreement between the A. H. Dept of the State Agricultural College, the cooperator and the Forest Service.

The circumstance which directly brought about the project, is chiefly the difference of opinion held by many of the cowmen in this locality as to whether or not it pays to feed a small amount of concentrate for the purpose of holding cattle up over periods of range food shortage. Some are of the opinion that a small amount, less than one pound per head, accomplishes less than no feeding at all, because it creates in the animal a craving for the concentrate and as a result they stay around the feed pen longer, come in from feed earlier and spend less time grazing and getting a fill that they should, considering the limited benefit derived from the feeding.

It was planned, originally, to use yearling steers in the experiment, but a uniform lot could not be obtained at the time, so, short yearling heifers were chosen. Fifty head, divided into 5 lots of ten each are being used. One lot of ten is not being fed. The other 4 lots are fed $\frac{1}{2}$, 1, $1\frac{1}{2}$, and 2 pounds of cottonseed cake per head per day, respectively.

The pasture in which the herd is being carried has an area of 1450 acres which is equivalent to 29 acres per head yearlong, or 58 acres per head for 6 months. During the

past 9 years it has been used as a feeding trap and has carried an average of 43.4 head each year which amounts to 34.2 acres per head. Since the experiment will be terminated at the expiration of 5 or 6 months, the pasture will be lightly stocked for this period.

The pasture is made up of three types, black grama, mixed grass and black brush creosote brush.

The grama type is 533 acres in extent and consists of about 70% grass, 28% weeds and 2% browse. Black grama (Bonteloua eriopoda) is the principle forage species in this type. The aristida and sand grass (sporobolus sp.) are next in importance and occur in smaller percentages along with several other grasses of secondary importance.

Yellow Bush (Psilastrophe tagetinae) is the principal palatable weed species occurring in this type. The browse is made up of mesquite and mormon tea and is of little import.

The mixed grass type covers 408 acres and consists of 86% grass, 12% weeds and 2% browse. Burro grass (Sclerepogon brevifolius), Tobosa (Hilaria mutica) and dwarf drop seed (Sporobolus auriculatus) go to make up, approximately 90% of this type. Black grama, Saccaton and aristida are secondary and occur only to a limited extent. Weeds and browse are of little importance.

The Black Brush Creosote Brush type covers 509 acres and is made up of 50% browse, 47% grass and 3% weeds with the exception of mesquite which is of more importance. The browse species are for the most part non-palatable. Tobosa, Burro grass, dwarf drop seed, and saccaton make up about 40% of this type. Porter's muhlenbergia, side oats, grama and black grama are secondary. The weeds in this type are of little importance.

This pasture has been deferred for a period of 6 months including the growing season and received during the later period 4.26 inches of precipitation which is .5 inch below the mean seasonal for 50 years. Considering the drouth conditions that have prevailed during the past three years, the pasture is in fairly good condition, and would easily carry the number of stock now using it without feeding.

The results of the feeding of the yearling heifers in this pasture to date are as follows:

First 28 days.

Remarks	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
Average weight at start	367.6	370.0	369.8	364.7	364.3
Amount C. C. fed	1/3 #	1/3#	1/3#	1/3#	0
Average weight after 28 days	385.2	383.6	385.5	379.3	403.2
Average gain, 28 days	17.6	13.6	15.7	14.6	38.9

Second 28 days.

Remarks	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5
Average weight at start	385.2	383.6	385.5	379.3	403.2
Amount C. C. fed	.45	.85	1.22	1.13	0
Average wt., after 56 days	395.5	402.4	413.9	404.9	405.5
Average 28-day gain	10.3	18.8	28.4	25.6	2.3

All the lots being fed were given the same amount of concentrate the first 28 days in order to get the animals started to eating the cottonseed cake, and since some difficulty was experienced in starting them off, this no doubt accounts for the large difference in gain of the lot not on feed over the others. However, since the pasture was fresh and the grass fairly palatable, a considerable difference was anticipated.

During the second 28-day period the feed was increased in order to get the animals in their respective ration for the third 28-day period. The data shows that during the second 28 days the lot not fed gained only 2.3 pounds, while the other lots gained proportionately more with respect to the amount being fed, varying from 10.3# to 28.4# per head.

As the experiment progresses it is expected that the lot not being fed will gradually cease to gain and show an increased loss while those on feed will show gain in proportion to the amount of C.C. fed, with the exception of the first and possibly, the second lot which, due to the fact that they are receiving the minimum amounts, may also show a loss.

As the experiment progresses, the forage grasses in the pasture will lose in palatability and be less nourishing through bleaching out, and it is presumed that this will cause the animals to crave and depend more and more on the concentrate.

Just what the final outcome will be is hard to predict, but from the present aspect it would seem that the data will show just what amount is an economic ration in order to maintain stock being fed over the critical period and until a new forage crop is forthcoming at the start of the next growing season.

FURTHER WORK.

If possible, the College is in hopes of carrying on this experiment over a period of 3 or 4 years with the same animals, if arrangements can be made to pasture the stock. Naturally, the results over a period of years will be more conclusive than a one-year trial.

USE OF RESULTS:

For application in regions in the southwest where conditions are similar to those on the Jornada and for use where anyone is contemplating supplementary feeding for maintenance purposes during shortage of range forage.

Excerpt from Jornada Annual Report for Calendar year 1924.

Extra

GS
Range Destroying Rodents
Eradication and Control
Kangaroo Rats, 1924

The kangaroo rat eradication work which was carried on during the past summer on the Jornada was handled entirely by the U. S. Biological Survey, under the direction of R. H. Miller, Junior Biologist.

COST:

Since very little if any kangaroo rat poisoning had been done on a large scale in the past, two of the main objects of the campaign were to determine the cost and effectiveness of this work.

A crew of five men on horseback covered 78,000 acres in approximately, fifty days at a cost of $0.0193 per acre. It was estimated that a total of 204,211 rats were exterminated, averaging 3.21 rats per acre. The cost per rat being $0.0073. Since only one rat occupies each den, 204,211 dens were visited. Several formulas for poisoning the grain were used but the most effective and economical one was found to be a 1 to 30 mixture of Strychnin (Standard formula) used on steam rolled oats.

TYPE OF RANGE INVESTED:

The type of range most generally covered in this work was Black Grama, although considerable of the mixed grass type and sand hill type were also covered. Both the grama and mixed grass types as well as the sand hill type on the Reservation seem to be the most favored haunt of the kangaroo rat, probably because of the character of both soil and grass which is apparently well-suited to their habits.

Three species of rats were found to exist on the Jornada, (Dipodomys spectabilis, D. marrimai, and D. ordii). Two of these live by means of harvesting and storing up both seed and grass, the third lives by robbing the other two.

DAMAGE:

The kangaroo rat not only reduces the carrying capacity of a range by consuming and storing seed and grass, but causes the Potental carrying capacity to be reduced by devastating and the denuding of the area around his den

which is a factor in hastening the ultimate destruction of a range, particularly when it is being constantly overgrazed, as is the case on much of the Public Domain.

On the Jornada it was estimated that the kangaroo rats reduced the annual carrying capacity of the area covered by eradication fully 6% and a further reduction of 1/2 per cent has taken place by a reduction in the area capable of producing forage. In the past nine years Pasture No. 2 has carried an average number of 613 head of stock yearlong, equivalent to 60.0 acres per head. Having this as a basis, since this pasture is typical of the 78,000 acres poisoned, the Carrying Capacity of the 78,000 acres covered, and on the Mesa portion of the Reservation it has amounted to $241.00 per year figuring grazing at $1.50 per head. This means that over the past nine years, the Carrying Capacity has been cut approximately, 161 head, or equivalent to the loss of a pasture containing, approximately, 9700 acres.

Effectiveness of this work:

The work already done, however, will not assure the Jornada of the increased Carrying Capacity in the future of 161 head, because there remains considerable of a remnant of the rats which are increasing as time goes on, and unless the area is covered again the coming summer, it will not be long before the same conditions will exist as in the past.

In talking with Mr. Gray, Chief of the Rodent Control work of the U.S.B.S., he seemed to hold out considerable encouragement for not only going over the area already covered the coming summer, but including the whole Mesa portion of the Reservation in a final drive and clean-up. However, unless the infested country surrounding the Reservation is likewise covered it will be only a question of time until kangaroo rats will be back on the Jornada the same as before.

It is Mr. Gray's belief that where kangaroo rats infestations are as bad as they are in certain sections of South Central New Mexico, nothing short of well-organized campaigns, at least county-wide will result in successful eradication of these rodents.

Efforts are being made to start such a campaign in Dona Ana County where the Jornada Range Reserve is situated.